

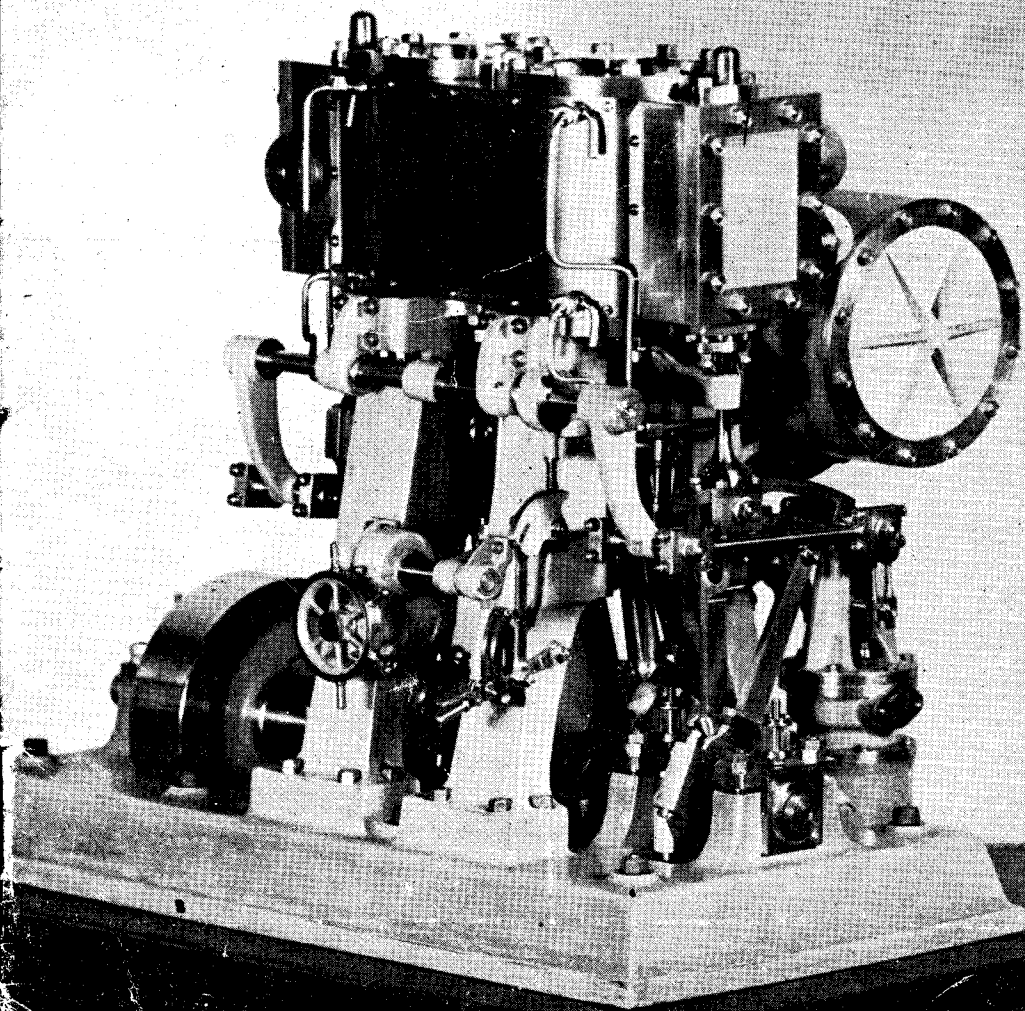
THE MODEL ENGINEER

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No. 2411

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The MODEL ENGINEER

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SMOKE RINGS

Our Cover Picture

● THIS week we reproduce a photograph of a sturdy piece of marine engine modelling. It is a compound condensing engine with reversing gear and air pump, based on the design for a compound condensing engine by Mr. C. S. Barrett, which appeared in the "M.E." for January 10th, 1924. The reversing gear is an addition to that design. The present model has been built by Mr. George E. Harting of Gravesend, and will be on view in the competition section of the forthcoming "M.E." Exhibition. It is 12 in. high by 9 in. wide, by 14 in. long.

A Philadelphia Hobby Show

● I THINK the news of the outstanding popularity of THE MODEL ENGINEER Exhibition must have impressed some of the bright minds of the great American city of Philadelphia, for I have received the prospectus of a gigantic hobby exhibition to be held there in October next. The show which covers all kinds of practical hobbies of course includes model making, and the value of the workshop is stressed very strongly in the publicity material issued in connection with the show. Here is an extract:—"Americans learned, too, by experience and by experiment of the therapeutic value of the home hobby. Today the doctor, the psychologist and the psychiatrist prescribe the workroom and the playground as better than medicine for scores of physical and nervous afflictions." This aspect of the home workshop has long been recognised in Great Britain, and the recent growth of model making of all kinds in the

States is a sure sign of appreciation of the mental recreation which the following of a constructive hobby provides. The "playground" recommendation of the doctors may be interpreted to cover the out-door aspects of model engineering as exemplified in power boating and model yachting, railway tracks, aircraft flying, and, nowadays, car racing. Fresh air plus a model interest provides a fine tonic for the jaded business mind. The show is to be held in the Commercial Museum of the Convention Hall, a building admirably adapted for the purpose, and an attendance of 100,000 people is confidently anticipated. All information may be obtained from Mr. J. Robert Whitesell, Suite 1311, Widener Building, Philadelphia, 7. I would offer my best wishes for the success of this enterprising venture.

A Kenley Society

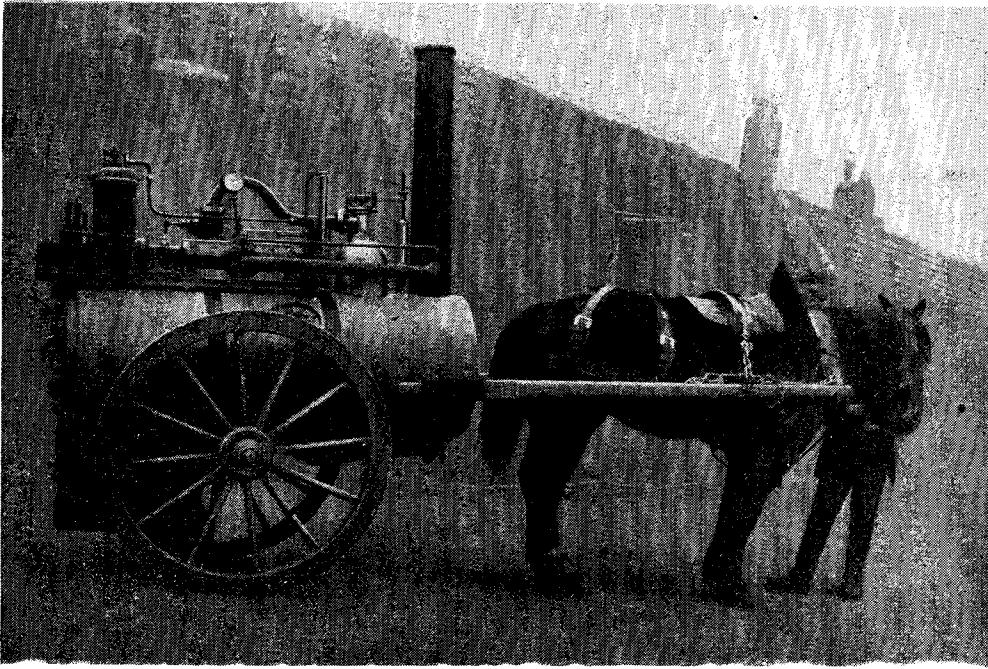
● A RECENT addition to the society amenities of the London area will be found at Kenley, where a model engineering club was formed last January through the instigation of the Kenley Community Association. A suitable hut in the grounds of the Kenley Memorial Hall has been erected, large enough for meetings and lectures and allowing work-bench space for about a dozen members. Although model railways appear to be the main interest at the moment, all branches of model engineering will be catered for. The President is Mr. F. H. Rogers M.I.Mech.E., M.I.Chem.E. and the Hon. Secretary is Mr. John L. Cotton, 8, Well Close, Wallington, Surrey.

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Eighty—Not Out

● A VETERAN of the model engineering community is Mr. F. O. Robinson, of Kettering, who having reached his eightieth milestone is still busy in his workshop. He has just completed a traction-engine model, the work of the past eighteen months, which behaves perfectly under steam at 50 lb. He is rightly proud of his relatives for his son-in-law has built another traction engine, 1½-in. scale, which took a cup at a recent Birmingham Society's show, and his son, Mr. Fred Robinson, has

This is a large upstairs room known as the Lecture Room in which we shall be able to place a number of chairs for those who wish to rest or talk quietly together. This room will also accommodate the Loan Section models which, though not many in number, will include some items of special interest. For space reasons we have not been able to accept all the loan exhibits which have kindly been offered, but we are keeping a record of these offers for another year. I would mention, in strict confidence, that the Lecture Room will also contain a small bar where thirsty souls may be refreshed.



The photograph reproduced above shows what is believed to be one of the earliest mobile electric generating sets ever constructed. For this we are indebted to Messrs. C. A. Parsons & Company Ltd., of Newcastle

developed a keen interest in yacht and power-boat modelling. Mr. Robinson started model making nearly 50 years ago when he was so much interested in the machinery of a Bristol paddle steamer on which he travelled that he went straight home and made drawings of the engine from memory. This was followed by the construction of a working model which reposes in his workshop today. There are other models there too, and a bicycle, all home made. He was for many years engaged on the engineering side of the Kettering boot trade, but his interest in model engineering has never flagged. I am waiting to hear what his next model is going to be.

An Exhibition Rest Room

● OWING to the large number of models entered for our forthcoming show we have been obliged to acquire another room in the same building, to give us and the visitors some extra space.

The Doctor's Prescription

● A SHEFFIELD reader who is about to go home after a spell of two years in hospital tells me that some friends have promised him a Myford lathe. He had lost the use of his arms, but is well on the way to recovery, and the doctor has now advised him to take up a hobby. "So," writes our friend "what is there better than model engineering?" His thoughts are running on a triple-expansion marine engine—a tall order to begin with, but as he has been a regular MODEL ENGINEER reader for some years his mind should be in tune with the task. Incidentally, he tells me that his present letter took him four days to write. I wish him a speedy return to full and enjoyable activity.

Perivall Hamway

WHAT TO SEE

AT THE 1947 "MODEL ENGINEER" EXHIBITION

Part 1—The Trade Stands

IN spite of the difficulties which are familiar even to the amateur engineer, the past year has seen a development in the commercial production of models, model making accessories, tools and equipment which reflects great credit upon the determination and industry of British manufacturers. No fewer than fifty firms will be represented at our exhibition this year and the following is a brief survey of some of the exhibits.

The Acorn Machine Tool Co. (1936) Ltd., 610, 612, 614, High Road, Chiswick, W.4. (Stands Nos. 9 and 10.)

Those with an appreciation of good tools will find much to claim their attention on these two stands.

Among a very comprehensive range of small tools are featured the "Little John" bench lathes, the Senior M.I. milling machines, band saws, grinders, wood-working lathes and a 7-in. bench shaper; also, a range of spare parts for "Atlas" and "Sphere" Lathes.

Adana (Printing Machines) Ltd., 15-18, Church Street, Twickenham, Middlesex. (Stand No. 11.)

Adana are old exhibitors at our shows, their stands usually create great interest, as they demonstrate what ingenious and creative work can be done with their small printing presses.

This year their new feature will be on view—a treadle/power machine as first shown at the B.I.F. Its range is remarkable. All the ordinary work of a general printer is within its scope—colour, half-tone and line, yet the amateur's viewpoint has not been neglected, for its operation is simplicity itself.

This machine exemplifies what British manufacturers can do when they really get down to combining refinement, finish, design and achievement at a reasonable price. Its features incorporate cylinder inking, twin inkers and vibrator roller, instantaneous throw-off and press button start and stop. The model also is manufactured solely as a treadle-operated machine.

Ian Allan Ltd., 282, Vauxhall Bridge Road, Westminster, S.W.1. (Stand No. 2.)

This firm are well-known for their extensive range of literature dealing with railway subjects, a selection of which will be displayed on their stand. They are also press agents for the famous Romney, Hythe and Dymchurch miniature railway, which this year celebrated its coming-of-age with a twenty-first birthday party.

Alpha Engineering Company, Perseverance House, Woolwich Road, S.E.10. (Stand No. 4.)

The outstanding exhibit on this stand is the "Homilograph" 16 mm. film projector. This

machine is designed to meet the demands of those wishing to show ciné film in their own homes. It is an entirely self-contained unit with a capacity for 50/100 feet film, and its design is the outcome of long experience and research. The materials used in the construction of this machine are of the highest quality and the price compares very favourably with other projectors on the British market.

In addition to the above machine, this firm produces a fine selection of engineer's small tools, specialising in standard and non-standard reamers and milling cutters.

Bassett-Lowke Ltd., Saint Andrews Street, Northampton. (Stand No. 21.)

The name of Bassett-Lowke Ltd. is, of course, a household word in the model engineering world and, as would be expected, this firm is showing what in these days of manufacturing difficulties is an extremely comprehensive range of model locomotives and rolling stock of steam, electric and clockwork drive.

Their range of model ships, power-plants and accessories and indeed supplies for model makers of every description is far too great to cover in this announcement. All visiting their stand, who are interested in "O" gauge locomotives will find that the range exhibited in this class is of exceptional interest and special attention has been devoted to the development of electric motors of a new and highly efficient design suitable for the 12-volt D.C. supply, now standard.

Buck and Ryan Ltd., 310-312, Euston Road, N.W.1. (Stand No. 39.)

This firm, so well-known in model engineering circles, is our oldest trade exhibitor, having exhibited at every MODEL ENGINEER Exhibition without fail, except the first one.

A 53 ft. display of tools and light machinery will delight the hearts of model engineers. The range covered by this exhibit is far too great and varied for us even to attempt to describe, so we will content ourselves with saying that this year the selection and variety is even greater than that of their pre-war exhibits.

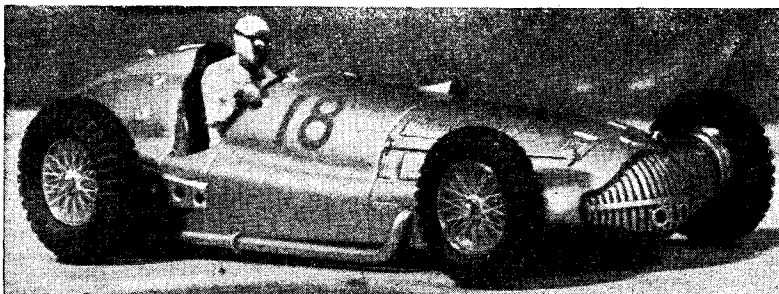
In attendance on the stand will be Mr. R. A. Ryan and Mr. W. Ryan, well known to so many model engineers.

Cartwrights' Model Supplies Ltd., 19-21, Elystan Street, S.W.3 (Stands Nos. 16 and 17), market a comprehensive range of constructional kits, materials and accessories for model railways, ships, aircraft, cars and lorries. "OO" gauge enthusiasts will be interested to see the excellent assortment of true-to-scale items such as telegraph poles, load gauges, water columns, gradient posts, trees, hedges and even Belisha

beacons, and street lamps. In fact, every conceivable item necessary for a true-to-life layout.

Corbett's (Lathes), Stanton Hill, Nr. Mansfield, Notts, (Stand No. 41) will be exhibiting their well-known lathes, milling machines and a selection of motorised bench and pillar

The use of these precision tools opens up new possibilities for the enthusiast interested in accurate finish, and, in view of the rapid development now taking place in the field of miniature prime-movers, a visit to their stand is recommended to all who aspire to efficient running of their engines.



"Mercedes" Grand Prix model from a kit by Messrs. Cartwrights Model Supplies Ltd.

drills, electric motors, chucks and small tools. Their reputation for quality stands high among model engineers and a visit to their stand will be amply justified by the extremely interesting machines exhibited.

Craftsmanship Models Ltd., Norfolk Road Works, Ipswich. (Stand No. 22.)

This Company has acquired the reputation for supplying the requisite castings and material for the amateur who prefers the unusual model. In the I.C. engine class, they make a special feature of Mr. E. T. Westbury's 15-c.c. four-cylinder water-cooled petrol engine, the "Seal." The castings and finished engines are available for inspection, also the prototype for a 30-c.c. version of this engine. Another unusual engine is the "Craftsman Twin"; a horizontally opposed twin two-stroke of 10-c.c. capacity which has good possibilities for aircraft, power boats and race cars, owing to the low overall height and the small frontal area. Kits of castings and materials are also available for the amateur constructor.

Various power boats hulls of the hard chine class suitable for these engines are on display on this stand. Miniature magnetos are becoming very popular and finished magnetos and parts form a comprehensive display of the new development.

The C.M.L. watchmakers type lathe also exhibited is invaluable for the craftsman who undertakes the smaller types of model making or has horological interests, and incorporates a number of novel features.

High grade boiler fittings to the standards followed by builders of "L.B.S.C.'s" locomotives will be exhibited as representative of the tooling capabilities of the Company.

Delapena & Son Ltd., Zona Works, Cheltenham (Stand No. 20), are showing three items of equipment, namely a lathe hone, an external hone, and their motorised bench honing machine.

Of primary interest will be the range of honing mandrels, illustrated on the next page. These mandrels can be fitted to a lathe or to any other suitable rotating machinery. They are capable of working to 0.0001 in. limits and have been designed for use in tool rooms, small engineering shops and by model makers and others who do not have sufficient precision honing work to justify the installation of more expensive machines.

The lathe hones consist of two main parts, the control head and the mandrels. The mandrels are interchangeable, so that one control head will cater for a number of different size mandrels. Several control-heads are available and mandrels suitable for bores from 0.185 in. to 1.010 in. are obtainable.

There are two types of interchangeable mandrels, one range being made from hardened steel and the other in die-cast aluminium alloy. The latter, whilst giving equally accurate results, do not possess the same useful working life as those made from hardened steel. These die-cast mandrels are ideal for model makers and others who are not interested in using the mandrels continuously.

T. Garner & Son Ltd., Sheffield Road, Barnsley (Stand No. 37), are exhibiting a fine range of tools for the model engineer. Among them being "Myford" lathes, "Coronet" lathes, "Champion" drilling machines and many others, together with a range of high quality hand tools. This well-known firm understands the needs of model engineers and home-craftsmen and has developed their business to cater for the particular needs of enthusiasts.

Hamblings, 10, Cecil Court, Charing Cross Road, W.C.2 (Stand No. 32-33), are exhibiting a detailed working layout in standard "OO" gauge operated entirely on the 2-rail system.

The firm's insulated chaired track, fully patented, is used, and parts are on sale. This layout is only 10 ft. by 8 ft. and can be built in a normal size room and gives

scope for really interesting working and operation.

In addition a full range of Hambling's new litho sheets, castings and parts too numerous to mention individually are on sale at the stands. The firm have specialised exclusively in "OO" gauge for the past 20 years and inspection of these stands will prove their slogan that it is the "Home of 'OO' Gauge."

J's Model Centre, 6, Blenheim Grove, Rye Lane Station, S.E.15. (Stand No. 7.)

Featured on this stand will be the well-known aeroplane modelling kits and the "Keelbild" galleon kits and ships' fittings. Included in the range are models suitable for the beginner and also models of aircraft famous during the 1914-1918 war. Also on view will be a new 2.5-c.c. compression ignition engine designed and built to give long service with the minimum of wear.

In addition, this firm markets an extensive range of air wheels, aero accessories and model engineering supplies.

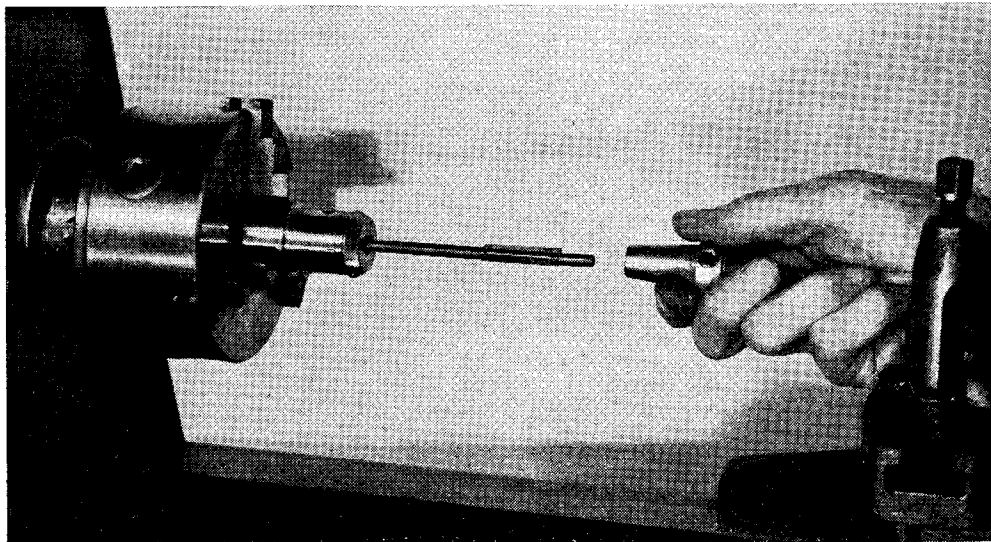
many new diesel- and rubber-driven duration kits may also be seen.

Kennion Bros. (Hertford) Ltd., 7, Greenways, Hertford. (Stand No. 23.)

This firm will be displaying the largest range of castings for locomotives designed by our well-known contributor, "L.B.S.C.," ever to be shown in any exhibition. Partly machined cylinders will be a special feature together with all-brazed boilers for several types of locomotive.

An extensive range of taps, dies, drills, screws, rivets and lathe accessories will also be on view.

Percival Marshall & Co. Ltd., 23, Great Queen Street, London, W.C.2 (Stand No. 54), will have a display of their latest books, blueprints and other publications catering for our hobby and allied subjects. Strictly limited supplies of *THE MODEL ENGINEER*, *The Model Railway News*, *Model Aircraft*, and *Model Car News* will be available.



Honing mandrel shown by Delapena & Son Ltd., Stand No. 20

Juneero Ltd., Stirling Corner, Boreham Wood, Herts. (Stand No. 3.)

Demonstrations of the extremely useful Juneero multi-purpose tool will be seen at this stand together with an interesting range of working models made from the materials supplied by this firm for use with this tool. There will also be exhibited a splendid selection of accessories for model makers and engineers.

E. Keil & Co. Ltd., 195, Hackney Road, E.2 (Stand No. 36), are the wholesale distributors in the United Kingdom of the Mills 1.3-c.c. diesel engine and the well known K6 petrol engine.

Exhibited on their stand will also be the famous Keil Kraft model aeroplane kits and accessories. The 1947 range, including over 50 models from the 12 in. "Vega" to the 8 ft. "Falcon" and

M. and E. Models Ltd., High Street, Exmouth, Devon. (Stand No. 19.)

Model racing cars, model car kits and numerous components and accessories will be shown on this stand; also, electric-driven cargo boats and launches, decorative ships models and high-class steam power units, specially designed for model boats. The "Peco" Track Pack and other "OO" gauge railway components will also be exhibited on this stand.

Mills Bros. (Model Engineers) Ltd., 2, Victoria Colonnade, Southampton Row, W.C.1. (Stand No. 29.)

This firm has made a name for itself in model engineering circles which is now being further enhanced by its 1.3-c.c. diesel engine.

Also featured on the stand is a comprehensive range of model railway equipment and supplies.

Model Aero Supplies, Green Mount Works, Halifax, Yorks (Stand No. 51), market a very fine selection of kits and plans for building flying aero models. Models will be on display showing the finished article made up from the kits. They also market cellulose finishing lacquers and dopes, diesel aircraft engines, ignition coils and condensers, wheels and air-screws and a range of supplies far too numerous to mention.

Modelcraft Ltd., 77, Grosvenor Road, S.W.1. (Stand No. 18.) This firm specialises in plans and plan books for models of every description. They also offer a fine range of constructional kits and model makers' accessories.



Telescopic gauges by Moore & Wright Ltd.

Modella Engines (Bradford) Ltd., 42-44, Bridge Street, Bradford, Yorks. (Stand No. 6.)

The well-known "OWAT" 5-c.c. diesel engine will be featured on this stand, together with a range of component parts. This engine was designed and developed to meet the demand for a power unit of high performance and reliability without sacrificing simplicity of operation.

Model Roadway Ltd., 12, Cannon Road, Bromley, Kent. (Stand No. 52.)

This exhibit shows a remarkable model of a complete road system, incorporating both urban and rural settings, with main streets, by-passes, country roads, crossings, roundabouts, gradients and level crossings. The vehicles and traffic are controlled electrically, being semi-automatic, that is to say the operator can start, regulate, stop or direct each vehicle from a main control panel, but traffic control at road intersections or when overtaking is automatic.

Models (City) Ltd., 2, The Arcade, Liverpool Street, E.C.2. (Stand No. 15.)

This firm specialises in the supply of model railway equipment of all kinds from "OO" to 15-in. gauge. An interesting range of models will be on display, including aeroplanes, ships and trains—steam, electric and clockwork driven.

Moore and Wright (Sheffield) Ltd., 14-28, Norton Lane, Sheffield, 8. (Stand No. 1.)

An attractive display shows a comprehensive range of Moore and Wright precision instruments and Engineers' hand tools, including a number of new additions. Tools of outstanding merit include, Internal Micrometers, Telescopic Gauges, Screw Pitch Gauges, re-designed Micrometer-heads and Bench Micrometers, and a well-designed Automatic Adjustable Centre Punch.

A feature of Moore and Wright precision instruments which will appeal to model makers, is the dull chrome finish given to the graduations. This eliminates all glare and ensures accurate and easy reading.

Chief of Naval Information, Admiralty, S.W.1. (Stand No. 14.)

This is an extremely interesting exhibit of models and photographs illustrating the manifold aspects of life in the Royal Navy.

Precision Accessories Ltd., 12, Ogle Street, London, W.1. (Stand No. 35.)

Exhibited on this stand will be a range of model steam engines, fittings and castings, including the well known "Wedge" model, W.2 oscillating steam engine.

This firm market the famous "Astoba" universal machine tool, which can be used for no fewer than 16 entirely distinct machining operations, as widely diverse as screw cutting, horizontal boring, surface grinding, milling and hack sawing. This extraordinarily versatile machine can be inspected on their stand.

Prestico Ltd., (Sydney S. Bird & Sons Ltd.), Cambridge Arterial Road, Enfield. (Stands Nos. 24 and 26.)

Featured on these stands is a multi-purpose tool designed for model making. A high degree of accuracy is claimed for this machine enabling unskilled operators to work to fine limits.

A range of kits, parts, detailed drawings for making models and domestic articles will also be shown.

The Railway Publishing Co. Ltd., 33, Tothill Street, Westminster, S.W.1. (Stand No. 25.) will display *The Railway Magazine*, books and other items devoted primarily to railway subjects.

E. Rankine Gray, 691, Christchurch Road, Boscombe, Bournemouth. (Stand No. 8.)

We are told by these manufacturers that the textbook "Cardboard Rolling Stock and How to Build It" (now running to 13,250 copies, covering six editions, in less than three years) still remains the basis on which tens of thousands of wagons and coaches have been built from ERG Card Parts; those who have lingering suspicions that card produces shoddy or fragile models have only to examine the various card models which will be displayed, when they will realise that for strength, easy working and fine detail, card is the ideal material for rolling stock.

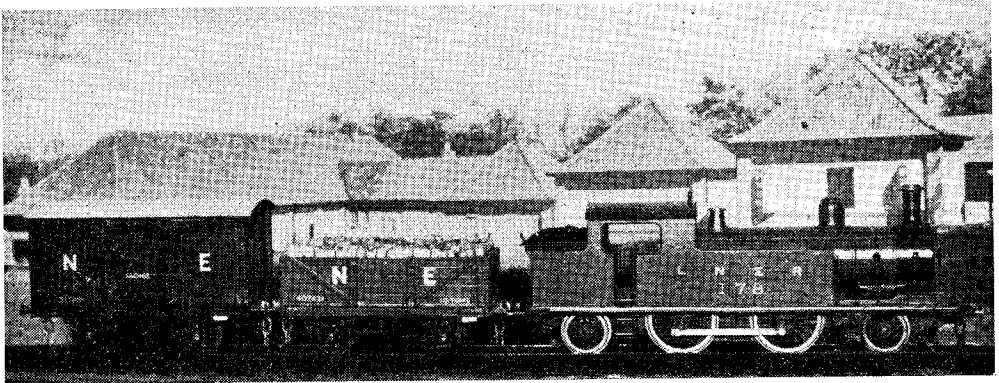
ERG parts and fittings include such advanced items as coach and wagon spring buffers for 4 mm. stock, and the latest addition to the range

is equally interesting... a parallel spring buffer suitable not only for locomotives, but for many coaches and wagons; ERG 3-link spring couplings complete the ideal drawgear.

The latest ERG production is of exceptional interest... the rolling stock springing unit suitable for 4-wheel goods stock and for coach bogies. An item of special interest is a detailed L.M.S. 4,000-gallon tender fully riveted; like the locomotives, buffers, couplings and wheels are

model making, and we understand that they have been fortunate in obtaining permission to withdraw from the Science Museum a model which they constructed for Messrs. Metropolitan-Vickers (Electrical) Co. Ltd., of a mobile power station. This model, which was on show at the B.I.F. is a miniature replica of the mobile power stations supplied by Britain to the U.S.S.R. during the war.

This firm will also be showing their well-known



Models made from ERG card parts. Stand No. 9

sprung, but the riveting is the notable feature. Very careful experimental work has led to what the makers believe is the first practicable riveting machine suitable for commercial use and capable of producing identical rivet heads in any desired position rapidly and accurately; future locomotives built by this firm will incorporate this feature.

Ridingberry & Co. Ltd., Feeder Road, Bristol. (Stand No. 5.)

Featured on this stand will be the well-known B.O.B. constructional kits and a wide range of models made from B.O.B. parts. A demonstration will be given on this stand of the B.O.B. method of construction.

Shenphone (Electrical Products), 226, High Road, Leyton, E.10 (Stand No. 48), famous for their rectifier power units for the operation of miniature permanent magnet motors and model railways, will be exhibiting an interesting range of control resistances for electric motors, automatic circuit-breakers and car engine starters and chargers.

Dick Simmonds & Co., 5, South Road, Erith, Kent. (Stand No. 34.)

This firm specialises in castings, fittings and equipment for the small locomotives designed by "L.B.S.C." and described in THE MODEL ENGINEER.

They are specialists in 3½-in. gauge equipment of which they hold the largest stocks in the country. Some fine models made from their own castings will be on display.

Stewart-Reidpath Ltd., Herne, Herne Bay, Kent. (Stand No. 46.)

One of the activities of this firm is commercial

range of Standard 4 mm. scale "OO" gauge die-castings for construction of locomotives, coaches and wagons, including their latest productions, such as a complete L.M.S. 3,500-gallon tender-body casting, with 6-wheel underframes.

"Advance" specimens of their new 12-volt D.C. mechanism, which they hope to have in production this Autumn, will be shown and demonstrated on a small track layout. Replacing their popular "Rejdmere" mechanism, it has greatly increased power output and makes full use of the latest developments in Magnet alloys. This will, in due course, be available for either two- or three-rail working.

A selection of other scale models and photographs illustrating their general model-making activities will also be included.

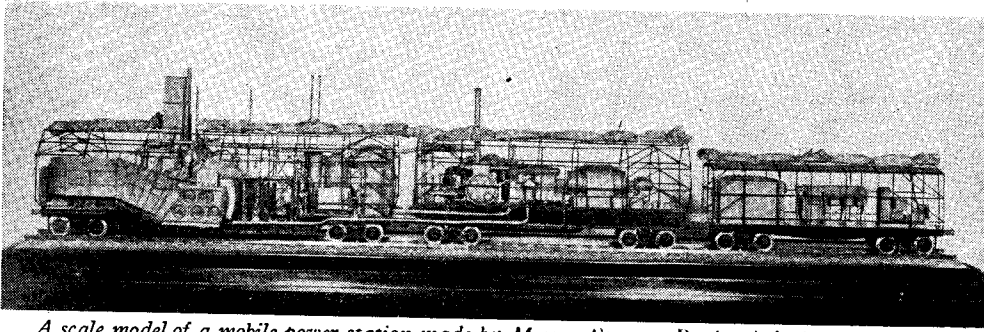
Ten-Sixty-Six Products Ltd., 90, Pimlico Road, London, S.W.1. (Stand No. 27.)

The outstanding feature of this stand is a model race car chassis in kit form, and the "1066" speedboat. 5- and 10-c.c. petrol engines and accessories for these are also included and a new 1-c.c. compression ignition engine.

A new design of "OO" gauge wheel, suitable for use with 2- or 3-rail systems and the associated components are shown as separate items and also as a kit, to construct a "OO" gauge 10-ton covered goods wagon.

Scale MODEL ENGINEER set-screws of various sizes and sets of castings for internal combustion engines, and a sectioned working model of the new "1066" engine are also to be seen.

Walkers and Holtzapffel (Retail) Ltd., 61, Baker Street, W.1 (Stand No. 31), will show a wide range of gauge "O" and gauge "OO"



A scale model of a mobile power station made by Messrs. Stewart-Reidpath Ltd. Stand No. 46

equipment, making a special feature of the products of their Associate Company—**Romford Model Ltd.**—which will include the “Romford” gauge “O” and “OO” mechanisms; loco., tender and bogie wheels and 2-rail track parts.

Watercraft Model Kits, 61, High Street, Teddington, Middlesex. (Stand No. 30.)

On display on this stand will be some famous old-time galleons and ships, and outfits for building faithful models of ships such as Sir Francis Drake's *Golden Hind*, in which he circumnavigated the world. Also Christopher Columbus's *Santa Maria* which discovered the New World; Henry Hudson's *Half Moon* (Halve Maen), discoverer of the Hudson River; Sir Hugh Willoughby's *La Bona Esperanza* which founded early British trade with Russia and Scandinavia; Lt. William Bligh's *Bounty* noted for the famous mutiny and the Pilgrim Fathers' *Mayflower*. Each of these outfits contains a complete set of parts with which to build these models.

A. West and Partners Ltd., 4, Abbey Orchard St., Victoria Street, S.W.1. (Stand No. 43.) Famous for their “Uno” stencils for lettering plans and making notices, etc., will again be showing these novel and useful outfits, but, this year, in an increased range of types, sizes and designs.

Messrs. West and Partners also market an extremely extensive range of drawing office equipment, inclu-

ding such interesting mechanisms as Planimeters, Pantographs, and a complete range of surveyor's instruments and accessories too numerous to attempt to describe in this resumé.

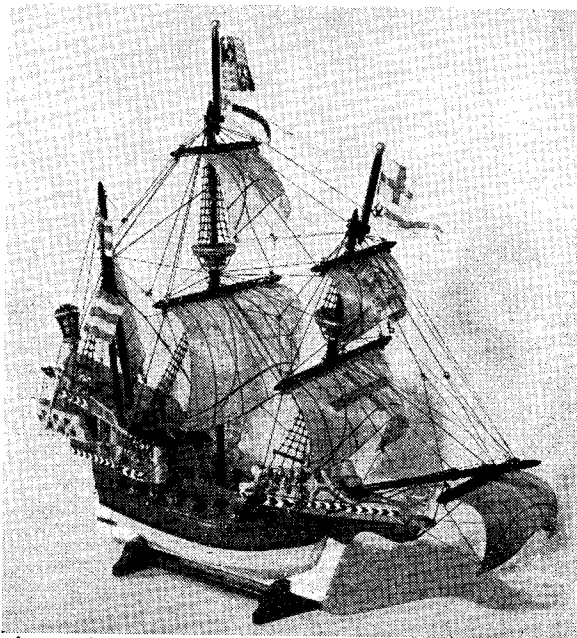
Also exhibited on this stand will be the Rectophot, a fully automatic document copying apparatus which can be used in subdued daylight.

Wilson's Lorries Ltd., 329, High Road, East Finchley, N.2. (Stand No. 12.)

This exhibit of outstanding interest will display the full ramifications of this increasingly popular pastime, which has made such a ready appeal to both young and old model makers. Lorry, and bus building kits, as well as 1948 models will be shown for the first time. There will also be on view a complete range of spare parts and die-castings, whilst an item of particular

interest will be the novel display of a 7 mm. scale factory scene showing, in the various stages of construction, models of the “Aristocrat” bus and “Autocrat” lorry. Visitors' interest is particularly directed to the display of Galleon and electrical motor kits, etc.

We hope to report further at a later date on items of exceptional interest and novelty seen on the trade stands during the exhibition. Much time will be spent by our staff securing information and pictures of items which we know will interest our readers.



A model made from a set of parts supplied by Messrs. Watercraft Model Kits. Stand No. 30

PETROL ENGINE TOPICS

* A 15-c.c. FOUR-CYLINDER ENGINE

By Edgar T. Westbury

WE come now to the final stages in the construction, including the minor items of fitting and assembly, which should present very little difficulty if the machining has been accurately carried out, but which have a far-reaching effect on the efficiency and reliability of the finished engine.

It has already been stated that practically all the joints between the various components can be made without the use of gaskets or other packing material, the joint surfaces being lapped perfectly flat, and a smear of varnish or other liquid jointing preparation being applied before assembly. There is, perhaps, at least one joint surface which cannot be lapped in this way, namely, the flange of the main bearing housing, but as this is a plain circular face with a register spigot, no difficulty should be encountered in machining it true enough, especially as it only has to hold tight against oil creepage.

My method of lapping flat joint surfaces is to use a piece of plate-glass, not less than $\frac{1}{4}$ in. thick, smeared with fine carborundum paste, and work the component evenly over its surface, taking care to avoid undue local pressure, by continually shifting one's hold on it. A circular motion of the work produces fairly good results if it is also rotated slowly on its own axis as well, but operators experienced in lapping generally adopt the characteristic "figure of eight" movement, which results in every point on the surface traversing the same linear distance, at the same mean speed. This treatment is continued until the surface of the work shows a perfectly even matt surface, after which it is thoroughly cleaned by washing in petrol or paraffin, particular care being taken to remove the abrasive from tapped holes and other interstices.

It may be remarked that the glass surface will not last indefinitely, as it is gradually worn

inaccurate, but it is not expensive to renew, as most glaziers have a few small offcuts of plate-glass which they are only too glad to get rid of. Thin glass is not desirable for this purpose because even if its surface is perfectly true—often it is not—it is capable of distorting to a considerable extent under pressure.

The matt surface produced on the joint faces is better than a highly polished surface, as it holds the varnish film more effectively. Care should be taken to avoid subsequent damage to the surface by scratching or burring; when small studs are screwed home there is a tendency to throw up a burr around the tapped hole, which should be avoided by lightly counter-sinking with a small centre-drill. Persistent

refusal of the joint to maintain tightness is generally due to "growing" or "seasoning" of the casting by the gradual release of internal stresses, and may call for some patience in getting it finally correct, but aluminium alloys are better than most other metals in settling down quickly.

Water Passages

The communication between the water passages in the body and cylinder-head blocks may be made in two ways; the first, which is the more common in motor car practice, is to form passages through the horizontal joint surfaces, in such location that they are clear of the combustion spaces and do not interfere with the gas-tightness of the joint. If, however, the constructor has any doubts about using the one joint surface to hold both water and gas pressure, an alternative method is to fit a bent pipe to the flange on the body casting, at the remote end from the water inlet, to carry the water up to a similar flange on the end face of the head. This method is sometimes used in marine engine practice, so it is by no means out of character with the model. No provision has been made on the head casting for fitting a flange joint on the head in this way, but there is sufficient metal on either end face to true up to an accurate

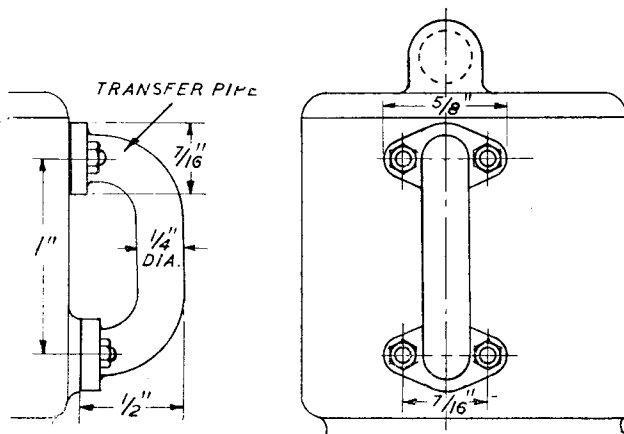


Fig. 46. Showing how a transfer pipe may be fitted to communicate between water jackets in main and cylinder-head blocks

surface, and drill and tap for the securing studs, as shown in Fig. 46.

If holes are drilled to communicate directly through the joint faces, their location should be as indicated in Fig. 47, and in cases where forced circulation is employed, three holes $\frac{3}{16}$ in. diameter and two holes $\frac{5}{32}$ in. diameter, in the positions shown, will be found sufficient. For thermo-syphon circulation, however, the passages should be of the largest possible area, so as to impede the free convection flow to the minimum extent, and it is thus desirable to open out the communication holes as shown by the dotted lines.

When the supply of circulating water is unlimited, as in the case of a marine installation, it is usually convenient to pass it once through the jackets and overboard, or into an exhaust cooler or water-injection silencer. But even in such cases, it may be an advantage to circulate the water in a closed-circuit system, incorporating a radiator or cooling tank, in order to avoid possible clogging of the passages with sand, mud, or weeds. Small radiators are usually of dubious efficiency, but effective re-cooling

but even so, the usual expedient of filing notches in the lower edges of the liners, to give clearance at this point, may be necessary.

The detail drawing of the connecting-rod (Fig. 16, April 17th issue) indicates the use of $\frac{3}{32}$ -in. set-screws in the big ends, tapped into the upper half of the bearing and cross drilled through the tail ends to take a security wire. In view of the smallness of these screws, and to promote accessibility, I have now found it better to cross drill the screw heads, which may be a good deal deeper than as shown, and need not be hexagonal. Tough material is essential for these screws, commercial screws not being regarded as safe; I recommend turning them from a piece of motor-cycle spoke, which should be annealed before machining. Do not attempt to screw them up to the bursting point, but secure the heads by passing a steel wire through both of them, and bending round the ends, in such a way as to resist any tendency to unscrew, as shown in Fig. 48.

Accurate Timing

When fitting the camshaft, it is advisable to

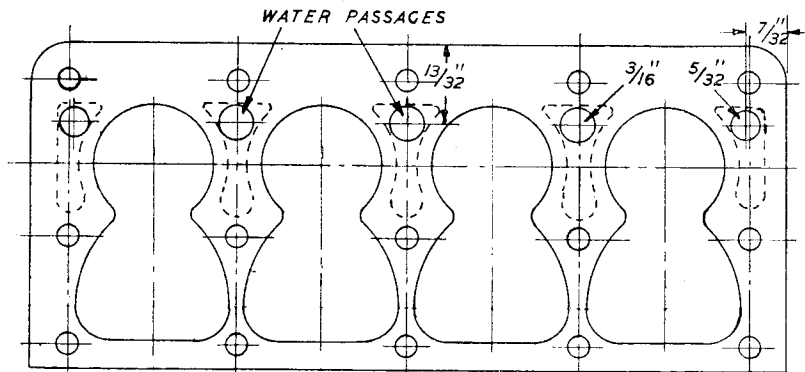


Fig. 47. Plan of cylinder-head joint surface, showing position of water communication holes. Dotted lines indicate how holes may be enlarged to suit thermo-syphon circulation

of the circulating water may be assured by running it through a keel pipe or similar form of cooler in contact with the water through which the boat is running.

Mechanical Assembly

It is most essential that all working parts of the engine should work perfectly smoothly and freely. Particular attention should be paid to the alignment of the pistons and connecting-rods with the crankpins, as mentioned in the April 17th issue, and side binding must at all costs be avoided; but the big-end bearings should not be given appreciable end clearance, as it is desirable to maintain the maximum bearing area on these bearings. End play, if necessary, should be allowed at the little ends.

In view of the offset of the cylinders, it may be found that the connecting-rods tend to foul on the valve chamber side when at the position of maximum angularity. They must not be wider than shown on the drawing, and may be rounded on the edges to reduce this tendency,

fix a disc to the flywheel, with the timing diagram marked on it, to suit the proper direction of rotation, and carefully set for top dead centre. This will enable the camshaft to be accurately timed (assuming that it is not positively keyed) and it will be found only necessary to check up on the valve vents for one cylinder, as the others will come right automatically if the cams are correctly machined. Insert the tappets and valves, and adjust them to the specified clearance in the closed position, holding the head with a screwdriver while manipulating and locking up the nuts. Check both the opening and closing points, by noting exactly when the tappet clearance is taken up. It is possible that the opening period may not agree precisely with that shown on the diagram, and if so, the difference should be split, so that the mid-open position is correct; exact opening and closing angles are of minor importance. When properly timed, tighten up the camshaft nut firmly.

All instructions for timing, so far, have been based on the assumption that the engine is

assembled as shown in the drawings, that is, to run anti-clockwise at the timing end. If the body is reversed, for the other direction of running, it is simply necessary to reverse the order and sequence of all timing vents, as if the entire system were viewed in a mirror.

Coupling and Oil Retainer Sleeve

These items have been omitted from previous detail drawings, as they may be open to variation to suit the purpose for which the engine is to be used. It is, in a general way, desirable to take the main drive from the flywheel end, by any kind of coupling which may be considered suitable, such as a pin coupling or flexible disc; but in many cases, the need for a main or auxiliary drive at the timing end is encountered;

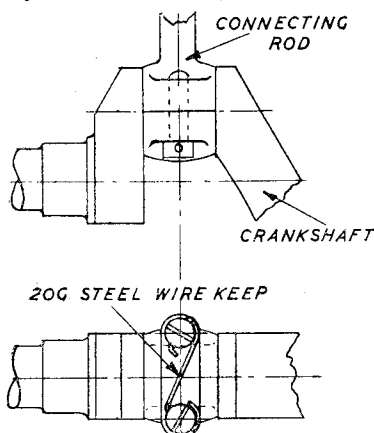


Fig. 48. Use of steel wire keeps to secure crankpin bearing screws

or it may be found desirable to fit a starter similar to that designed for "1831." If no coupling of any kind is required, a plain or castellated $\frac{1}{4}$ -in. B.S.F. nut may be fitted.

The form of coupling shown in Fig. 49 may be modified as required, to suit a simple "ball and pin," Cardan, or die-block type of universal joint, dog clutch, or face ratchet. It may also be combined with the oil retaining sleeve, if desired, as shown in the alternative detail drawing.

The sleeve acts as a spacer between the shaft nut and the timing pinion, running round with the shaft in the clearance bore of the timing case. A right-hand spiral groove is incised in its outer surface, to retard the escape of oil from the casing, and it should finally be case-hardened and polished; the coupling, also, may with advantage be hardened when its final form has been decided upon. For an engine of reversed rotation, it will be desirable either to screw the

shaft and tap the coupling with a left-hand thread, or to pin it in position; the oil retaining sleeve must also have a left-hand spiral groove.

Ignition Timing

General instructions on the timing of the contact-breaker and distributor have already been given; it remains now to connect the individual h.t. leads to their respective plugs. The centre lead, of course, goes to the h.t. terminal of the ignition coil, the others being connected so that the lead from the stud which is adjacent to the distributor segment at the time, goes to the plug of the cylinder which is in the firing position; that is, at approximately top dead centre with neither valve open nor about to open. Mark the distributor cover with the numbers of the leads, to facilitate subsequent assembly, and fit spring clips or other neat terminals to the lead ends for making connection to the plugs.

A Magneto for the "Seal" Engine

Several readers have asked whether I am going to provide magneto ignition for this engine. The answer is that, like quite a number of other features, it is an optional fitting, and provision for it has been by no means neglected in the scheme of design.

The simplest way to adapt the engine to magneto ignition is to do the same as I have done with the 50 c.c. four-cylinder engine constructed by Mr. Savage, as described some time ago; namely, to utilise the existing contact-breaker and distributor, in conjunction with a magneto of substantially the same type as that used for a single-cylinder engine. While this does not represent prototype practice, where the orthodox form of multi-cylinder magneto is employed, the latter presents serious difficulties for modelling on a small scale, and from the practical point of view, offers no advantages beyond that of correct appearance.

A self-contained magneto such as the "Atomag" type, or the ready-made "Mr." ma

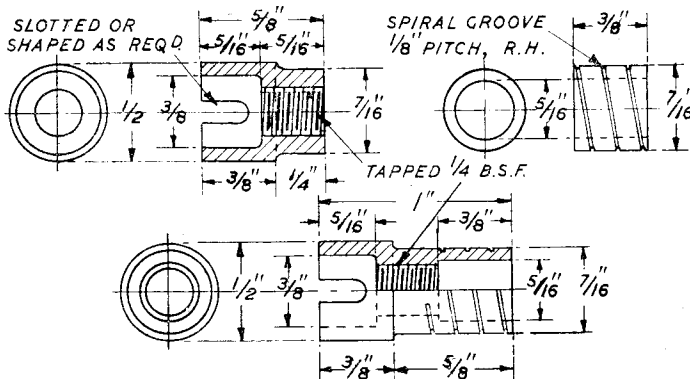


Fig. 49. Coupling and oil retainer sleeve, showing (below) an alternative fitting combining both components

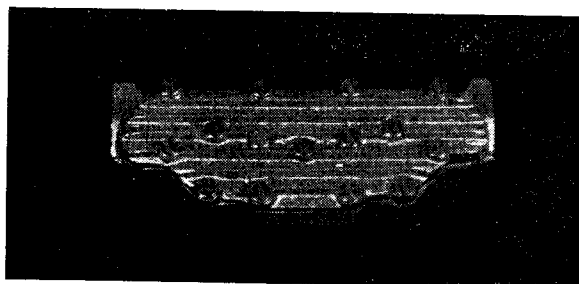
be used, fitted with a double-break cam, and direct-coupled to the main engine shaft in any

convenient way. Alternatively, a built-in fly-wheel magneto of the "Atomax" type may be used, and if adapted in size to conform with the size of the engine, is preferable in respect of compactness and neatness. I have in hand a design for a magneto well suited to this particular application, and hope to be able to arrange for

all fuel meticulously before putting it in the tank. Oil level should be kept well on the high side during the running-in period; it is much better to oil a plug than to score a bearing. Never succumb to the temptation to open the engine flat out without load, just to satisfy personal curiosity or show off to admiring friends; remember that there are four split big ends in the engine, and what *might* happen if only one of them failed to stand the strain is better imagined than described.

The "Seal" Steps Out

In this first essay in the design of a small four-cylinder engine, I have attempted to live down, to some extent, the reproach that small petrol engines are not "true models" (whatever that may mean), but at the same time eliminate the major difficulties of near-scale petrol engine modelling, and bring it within the scope of the average model engineer.



Inlet-exhaust manifold for the "Seal" engine

supplies of essential parts for its construction in due course.

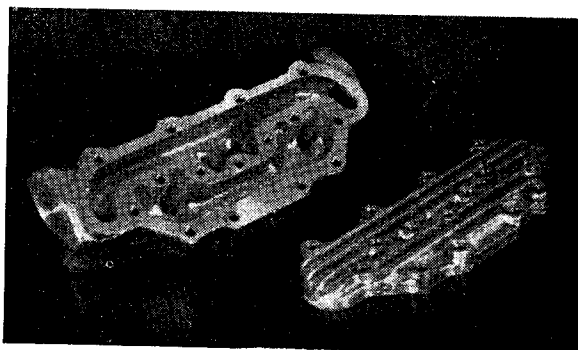
I must confess to being a little disappointed in the general attitude of readers to the small magneto; while nearly all petrol engine users are very enthusiastic about it and ready enough to adopt it, few of them seem prepared to tackle the job of making one, though the directions which I have given should be sufficient to enable any model engineer of average ability to carry out this work successfully.

Final Adjustments

These are not in any essential way different from those of a single-cylinder engine, neither should it be any more difficult to get the engine working, or to maintain it in an efficient running condition. As with any small engine, it is most essential that the compression should be good, and the valves tight, also that jet adjustment and other details should be carefully attended to. The standard form of ignition coil, as used with single-cylinder engines and running at normal voltage, will suit a "multi" fairly well, so long as it is of good quality and capable of a high spark frequency. As the drain on the battery will be greater than that of a single, be sure that the capacity of the battery is ample, or disappointment will be the result. The bad reputation which small petrol engines have acquired in certain quarters is very largely due to ignition trouble caused by cutting the margin of battery capacity and coil efficiency too fine.

Water!

Do not, in the hurry to get the engine running, forget to fit up the water circulating system, or—even more important—to fill it with water! I have known this happen many times, strange as it may seem. The fuel tank should be placed as near to the carburettor as conveniently possible, and within an inch or two below jet level. Filter



The manifold with cover removed to show exhaust and inlet passages

The intention to produce four-cylinder engines of similar type, but in other sizes, has been referred to earlier, and I have had many letters asking for both larger and smaller versions. I do not propose to make exact scale copies of the engine in various sizes, though this is quite practicable if readers wish to do it for themselves. I prefer, however, to explore other paths of design, to tackle new problems, and if possible, to attain still further facility of construction and elimination of snags. Supplies of castings and other essential materials of construction are still a problem, but this is gradually being ironed out and I hope to make a definite announcement about it in the near future.

I have already made some progress in the design of a 30-c.c. four-cylinder engine, and a friend is co-operating with me in providing another of 10-c.c.—the smallest size I can contemplate with equanimity at present. But please don't write and ask for advance details of these designs yet—they will be made public when the time is ripe. For the present—Hush! keep it dark—my lips are SEALED!

REBUILDING A LATHE

by G. H. Reed

THIS article is intended to outline the alterations and modifications carried out on a lathe to suit the individual requirements and ideas of the owner and in no way implies that the original construction was at fault. As has previously been stated many times in these columns every turner has his own ideas about lathe design but they are all to the same end—

seemed most inadequate for the job. With bearing diameters of $1\frac{3}{8}$ in. and $1\frac{5}{8}$ in., the bore of $\frac{1}{8}$ in. through the mandrel appeared somewhat large, and the impression that the whole shaft was not stiff enough was confirmed by assembling it without the 3-speed pulley and tightening down the bearing caps so that it turned freely and without any slop. With a dial indicator mounted

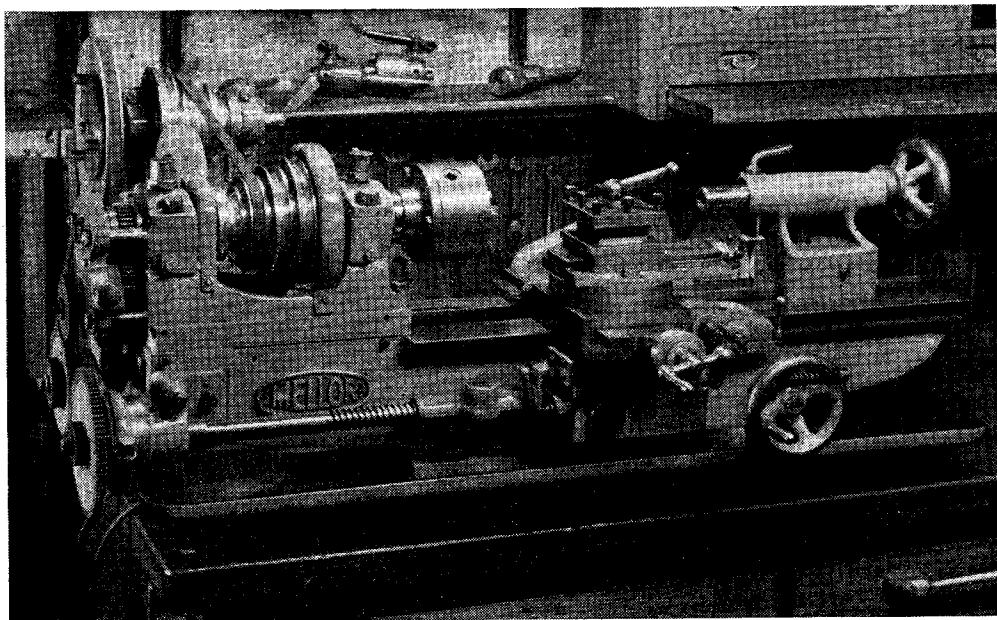


Photo by]

General view of lathe after all modifications

[Bernard Reed

that the machine should turn to some degree of accuracy and take a cut consistent with the size of the lathe.

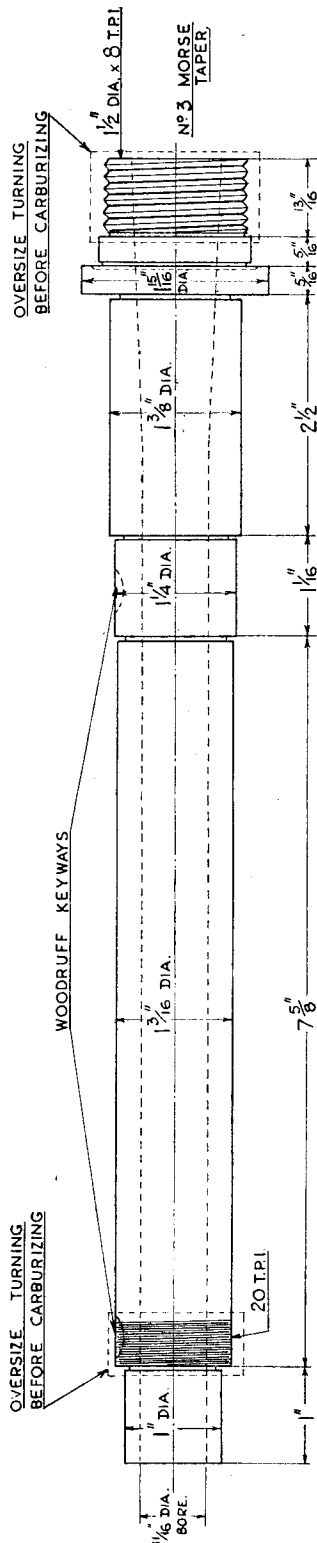
The lathe in question is a Mellor $3\frac{1}{2}$ in. (now $4\frac{1}{2}$ in.) and was bought in the early part of last year from a scrap-iron dealer, though not at scrap price, since he described it as a "runner." As far as can be gathered, it was manufactured in 1942, so there is a certain amount of "war finish" about it. At the time it was bought, it appeared to have had little legitimate use but was rather badly knocked about in places.

The Mandrel

This was the first part to receive attention largely because for some unknown reason the diameter of the shoulder against which the chuck backplate butted was only about $\frac{1}{8}$ in. more than the nose thread diameter. There was a register portion about $\frac{1}{16}$ in. long, but the shoulder

so that the button made contact with the mandrel midway between the bearings, the chuck was prised up with a bar resting on the lathe bed and it was possible to get a bend of .001 in. to .002 in. without undue effort.

Thus it was decided that the only thing to do was to make a new mandrel with a more generous shoulder for the nose and with a smaller bore. It was turned from a 2 in. bar of $3\frac{1}{2}$ per cent. case-hardening nickel-steel and since it was to be hardened and ground, those portions which were later to be screw-cut were left $\frac{1}{8}$ in. oversize as indicated on the drawing. The ground portions were turned .020 in. up. It was bored the final diameter of $\frac{1}{8}$ in. with the No. 3 Morse taper rough turned. The carburising was done with the assistance of a professional acquaintance who filled the bore with clay to prevent it becoming carburised. Returning the mandrel to the lathe, the screw-cut portions were turned down



ALL DIAMETERS GROUND

LATHE MANDREL

to plus 0.020 in. thus removing the cased surface metal, so that the hardening treatment did not affect it. The two Woodruff keyways were cut at this stage. As indicated in the drawing it is advisable to leave these oversize portions about $\frac{1}{8}$ in. longer than the final thread to ensure that unhardened metal remains over the length of the thread. The shaft was then hardened, and after fitting M.S. plugs in the ends, centre-drilled true with the shaft, it was straightened as much as possible with the aid of the hardener and his equipment. The grinding was done commercially and was a very nice job.

Before removing the old mandrel some provision had to be made for cutting the new and larger thread in at least one of the old chuck backplates, as there was no other lathe on which to cut them. To do this a plug gauge was made consisting of a thread and register portion of the dimensions of the future mandrel nose. To ensure accuracy of form the thread was chased with a die from a Herbert die-head. The backplate of the 4-jaw chuck was then bored and screw-cut to suit the plug gauge.

Having completed these very necessary preparations, the new mandrel was fitted in the old headstock bearings, taking considerable, though as it turned out later, misplaced, care with the scraping-in. Why the care was wasted is explained later.

The screw-cutting of the nose was carried out very successfully with the aid of the Herbert die as a chaser. Although the carburising had been turned off, the heat-treated nickel-steel was very tough to turn though suitably hard to resist the abrasion of screwing chucks on and off. Turning the Morse taper was a slow task, as the bore turned out to be pretty hard but again this was a good point.

Raising the Centre Height

At this point the question of whether it was feasible to fit 1 in. bolsters under the headstock, tailstock and topslide arose, and taking into account the generous width of the bed and most parts of the lathe, it was decided that such an increase of centre height would not seriously affect the sturdiness of the lathe. These bolsters are simply blocks of cast-iron recessed and tongued to mate with the lathe bed and the tongues on the headstock and tailstock castings. The former method of clamping the tailstock to the bed by means of a nut and spanner was abolished in favour of a lever clamp, while the old bolt and nut is retained to clamp the tailstock to the bolster, thus the set-over adjustment is not affected.

The block under the topslide is a disc of cast-iron having a T-slot machined in one of its faces to accommodate the bolts of the topslide, while the graduations on the periphery permit angular settings of the slide. The block is screwed to the cross-slide with Allen screws.

Fitting the headstock casting to its bolster revealed a defect in the design of this component. It was clamped to the bed in the normal fashion by two bolts through lugs at the chuck end and a clamping bolt and plate under the ways at the other end and at the first fitting the bolster was merely sandwiched in between.

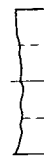
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However, it was discovered that when the lathe was taking a heavy or uneven cut, the film of oil along the joint of the bolster and the headstock kept bulging in and out, indicating that the headstock casting was not as rigid as it might have been. This was corrected by fitting $\frac{5}{16}$ in. Whit. Allen screws countersunk in the bolster and threaded into the casting and then assembling the whole issue as one.

Cross-Slide Screw

Raising the centre-height by 1 in. also entailed increasing the travel of the cross - slide at least by the same amount, but since the lathe is used

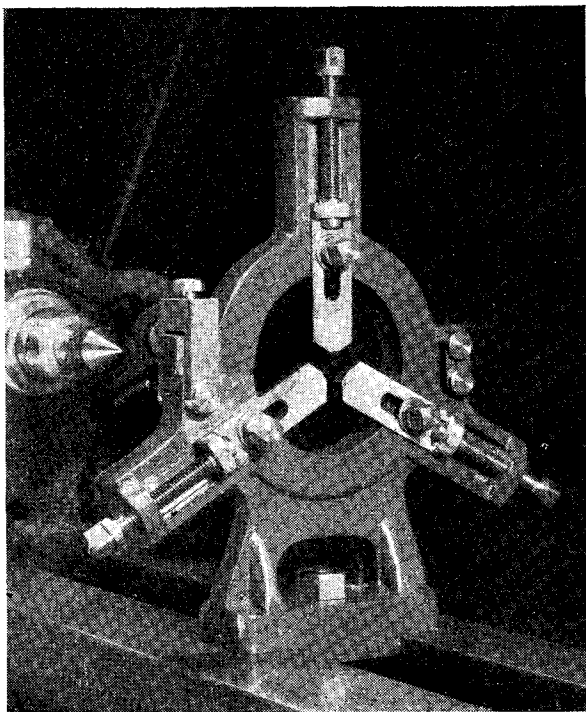


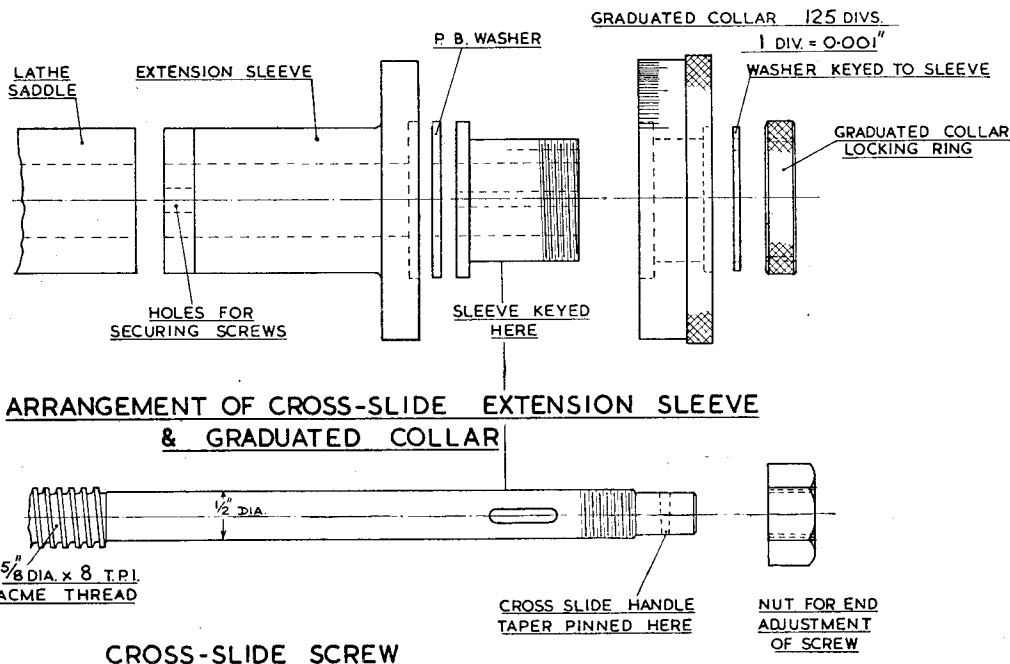
Photo by]

[Bernard Reed

Fixed steady in position on lathe

a lot for milling with a vertical slide, when plenty of movement is of advantage, it was thought that an extra $1\frac{1}{4}$ in. of movement would not be out of place. The old screw was 5-t.p.i. but the new one is 8-t.p.i. Acme and is made of 3 per cent. nickel-steel. An extension sleeve to carry the additional length of screw has a plate at one end bearing the zero mark for the graduated collar and is screwed to the saddle. Fortunately the channel between the 'V' slides of the cross-slide which permits the nut to travel was of sufficient length to allow the nut to move another $1\frac{1}{4}$ in.

(Continued on page 153)



JUDGING AT THE "M.E." EXHIBITION

by Percival Marshall

ONE of the most interesting features of THE MODEL ENGINEER Exhibition is the Competition Section, and the awards of the various prizes and diplomas made therein. Although there is a very generous list of prizes, I am pleased to think that this is not the only attraction to many of the competitors. In many instances I am sure that the entry is made not with the dominant hope or expectation of getting an award, but with a desire to contribute something to the general interest of the show, and, I think I may also say, to have the honour of appearing in the outstanding model display of the year. For it is an honour to be represented in such fine company, and it affords an exceptional opportunity of comparing one's own work with that of acknowledged masters of the craft. Sometimes a competitor is agreeably surprised at getting a diploma, or even a higher award. He has said to me "I am delighted, I never expected to get anything at all, but I just thought I would like to show my work, to interest others." Everybody cannot get an award, or there would be no virtue in such a distinction, but the underlying purpose of the competition is to recognise meritorious work, and to give encouragement to those who, in the opinion of the judges, deserve it. There is no doubt that this annual competition has done much to raise the general standard of model making and home handicraft, and the opinion of competent judges, as exemplified by the awards they make, is a valuable contribution to this end.

The work of judging must naturally proceed slowly if justice to the exhibits is to be done. For the major awards the competition is very keen, and the details of a number of elaborate and finely-constructed models have to be carefully examined and compared. The judges inspect the work and allot their marks, and if the results are close, they will examine the models again and again until a final decision is reached. A very small point may be sufficient to turn the balance. The award will be made as an honest opinion, without fear or favour. There is this point to be remembered, all the judges in the respective classes are themselves model makers of long experience and outstanding ability. It is a laborious and painstaking duty, undertaken with a true appreciation of the efforts of the competitors and a love of good craftsmanship. I am very grateful for their willing co-operation, and for the high service they render to model engineering. This testimony will, I am sure, be endorsed both by the competitors and by the visiting public. The results of their deliberations will be posted in the Exhibition from time to time, as their decisions are made. May I also add a word of sincere appreciation of the co-operative spirit of the competitors, and of the trouble taken to place their work on view.

Although the judges have a perfectly free hand in making their awards, I have drafted some suggestions for their guidance, to secure a uniformity of outlook on their work. I re-print

these suggestions herewith, as I think the competitors may like to know the considerations which will be in the minds of their official critics, and local societies may like to use these observations as a basis for the judging in their own competitions.

Some Notes for the Guidance of the Judges

The awards made at THE MODEL ENGINEER Exhibition are now generally accepted as setting a standard of good model making as determined by the critical judgment of experts. To achieve a high award of any kind is regarded among model makers as a real and well-deserved honour. It is important, therefore, that the judges should not only be impartial in their decisions, but should be thorough in their examination of the work submitted, and critical in their appraisal of good engineering or other model making achievement and practice.

Although this section of the exhibition is termed a "competition," it is only strictly competitive in the placing of the cups and the principal awards in the respective classes. The various money awards, and the diplomas—V.H.C., H.C., or C., are really encouragement awards, and may be given in recognition of meritorious effort of various kinds, such as good craftsmanship, novelty or originality of design or constructive methods, or of work done under difficulties of lack of equipment or other handicap. The judges are free to select work of this kind for recognition within the limits of the prize-fund available. There is no restriction on the number of diplomas, but it is suggested that these are only allotted in cases where there is some real merit deserving of recognition. Everybody cannot expect an award, and too many awards cheapen the value of those which are distributed. Where a money prize or diploma is awarded, it is desirable that the judges should add to their record a phrase such as "for good workmanship," "for originality in design (or construction)," or "for general merit," etc.

A total sum of £37 10s. 6d. is available from the "Prize Pool," for allocation in the above way. This arises from the generosity of private donors. It is suggested that the individual amounts awarded should range from £3 to 10s. No money prizes should be attached to the cup awards, but a medal award may be supplemented by a money award in cases where exceptional merit is shown. Similarly, close runners-up for a medal, may receive a V.H.C. diploma plus a money award. The recipients of lesser money awards will automatically receive a diploma of corresponding degree.

Of the "Prize Pool" the sum of £10 10s. is to be allocated to junior work as the "Frank Moore" Memorial Prize; this may be divided up at the discretion of the judges.

This year a pair of vee-blocks, offered by Messrs. Grey and Rushton, is available as a special prize in the tool section.

The judges are at liberty to make their awards if they so prefer on a general assessment of merit, but in cases where there is close competition for an award a system of marking by points will be found helpful. I suggest the following scale as a useful basis:—

<i>Workmanship</i>					
Quality .. .. .	..	..	..	..	100
Quantity .. .. .	..	..	..	..	100
<i>Design or Originality</i> .. .. .	..	..	..	..	75
<i>Finish</i> .. .. .	..	..	..	..	75
<i>General Merit</i> .. .. .	..	..	..	..	50
<hr/>					
Total .. .. .	..	..	..	..	400

To elaborate this scale:—

Workmanship means character of machining and fitting, accuracy of fit in working parts, and any difficulty in execution. The quantity of workmanship is an important element. An elaborate model involving very considerable detail, if well made, should score over a much simpler piece of work, even if the work in the latter is extremely good. The scale of the work should be considered, in regard to its accuracy or difficulty.

Design or Originality. Credit should be given for good or original design. If a prototype model is being judged, design will mean correctness to prototype. Free-lance models should be judged by their suitability for the purpose intended. Since it is not possible to test the working qualities of any entries, allowance should be made for any departure from scale prototype practice where an exhibit is classed as a working model. In particular, attention should be paid, where possible, to internal detail.

Finish. This involves good finish on all metal surfaces, and neat and characteristic painting. Finish should be appropriate to the purpose for which the model is intended, and to the colour and finish applicable to prototype or period models. Super "exhibition finish," such as unnecessary electro-plating, or detail, or the use of inappropriate materials, should be discouraged within reason.

General Merit. This is an indefinable quality, but an expert engineer or ship-lover can ask himself—does that please the eye?—or does it satisfy my sense of fitness? A good model, correct in proportion and detail, and well finished, will answer those questions automatically and corresponding marks should be allotted.

Finally may I express my cordial thanks to all those who are so kindly sharing in this responsible, and at times not too easy, work of judging. The examination of so much excellent craftsmanship will, I hope, be a source of pleasure to the judges, and the advantage of their expert opinion will be greatly appreciated by the competitors and by the general visiting public. Judges are human, and their opinions in some cases may vary, or may rest in the balance. I do not anticipate much difficulty arising, but I shall be available to give a casting vote or advice on interpretation of the rules if such should be necessary. I am anxious that the reputation of the exhibition for consideration and fairness to all the competitors should be maintained, and that our awards should continue to be regarded as honourable and valued recognition of good work well done.

Rebuilding a Lathe

(Continued from page 151)

In connection with the manufacture of the new nut to fit the new screw, some interesting experiments were carried out. As everyone who has ever made a new nut for a lathe slide will know only too well, it is very difficult to machine the spigot and the thread in the correct location to one another, particularly where the spigot is not in line with the thread as in this case. Opinions differ as to which machining operation should be done first. Here it was thought to overcome the difficulty very easily and at the same time make it possible to renew the nut just as easily when wear made that necessary. The carcase of the nut was turned out of mild steel with a close-fitting spigot but a $\frac{3}{4}$ -in. hole for the $\frac{3}{4}$ -in. screw, the former bored somewhere nearly in the correct position. The idea was to assemble the cross-slide, screw and nut in their correct positions, coat the screw with a mixture of lamp-black and oil and, using asbestos string to seal up one end, pour lead, white-metal or Cerromatrix in at the other to form a female thread in the correct position. This all sounds delightfully easy but I did not find it very practicable. When it was possible to get the metal to flow into all the recesses of the Acme thread

it was almost impossible to turn the screw, it fitted much too well.

Eventually that method was abandoned and, again as an experiment, a rather roundabout method adopted. This way ensures success only provided that the original nut was machined correctly. The nut was first turned as a phosphor-bronze blank with a spigot to fit the existing hole, and then a piece of $\frac{1}{2}$ -in. M.S. plate about 2 in. by 1 in. was cut out and a hole turned in the centre to fit the spigot fairly closely. With this plate clamped to an angle-plate on the faceplate the old nut was set up with the screw in position, and by adjustment of the position of the plate the screw was made to run true. Without upsetting the position of the plate the new nut blank was substituted for the old nut and clamped down. The thread was then cut in that position, with the assurance that it was in the right position.

The graduated collar and its assembly is shown in the drawing. The collar and the knurled ring that locks it are made of duralumin or some hard aluminium alloy which takes the knurling and the graduations very well.

(To be continued)

THE SHIP MODEL SOCIETIES

By "Jason"

A STRONG committee from the Metropolitan Societies has been formed to accept and operate the Ship Modellers' Stand at THE MODEL ENGINEER EXHIBITION, placed at the disposal of ship modellers, in co-operation with model yacht sailers. Do not forget when visiting the exhibition to call at the stand and sign the book. There will be two books, of course (ship models and model yachts). This signing of the book, for example, is not an autograph hunting stunt. It is designed to bring lone wolves together; to acquaint secretaries with prospective members-to-be, in short, an aid to the formation of new societies, and a reviver of old societies. I have not heard what special arrangements are being made, but be sure there'll be something interesting to see on the stand. On previous occasions there have been ladder jigs in operation, making rope, block-making and always there are half a dozen modellers about. Another thing, you can arrange to meet friends there.

North London

I hear that this society have a strong entry for the Inter-Club Cup. As they have had a number of medallists in the past, they are well aware of the standards required. Meets, first Friday each month at the Club House, 19, Compton Terrace, Highbury Corner, Islington. Write secretary, M. E. MOON, 53, Freegrove Road, N.7, for current syllabus.

The Ramsgate Windjammer

The *Bounty* in Ramsgate Harbour is an old windjammer. At present she is being used as a cafe. At the time of my visit (in May) she was in a poor way aloft, but I suppose she has been spruced up somewhat. If you are interested in windjammers she is worth a visit, even though she is one of the smaller windjammers. My visit to Ramsgate was for the special purpose of looking at the old tug-boat *Aid*. She was a paddle-wheel steamer. Forty-two years ago to the week I was on my first voyage in the full-rigged ship *Brenda* from Hamburg and ashore on the Goodwin Sands. The *Aid* towed the lifeboat out to us and I wanted to see the *Aid* again. The Ramsgate Harbourmaster told me she had gone years ago, but referred me to a group of three men on the quayside. Two had been in the lifeboat which came out to me, the other was the son of one of them, and a member of today's lifeboat crew. Did they remember my ship? "Yes, that was the Captain who kept us off, threatened us, and even refused us water." Small world! We had quite a long yarn. Incidentally, Cooper (father and son) are the second and third generations in the Ramsgate Lifeboat. In an old copy of *Ships and Ship Models* quite recently I saw a reference to the old man Cooper.

Wembley

I introduced a young friend of mine to the

Wembley Society recently. On the way I asked him his particular interest in ship models. "Henry VIII's *Great Harry*," he said. On arrival, Mr. Purvis showed me the chairman's gavel; the handle part was made out of timber from the King's yacht *Britannia* AND THE HEAD WAS FORMED FROM PART OF A TREENAIL FROM THE FLOORING TIMBERS OF THE *Great Harry* OF HENRY VIII. Small world!!

Don't forget if you live in the north-western suburbs of London, to contact the Wembley Secretary, ROGER FINCH, 32, Bedford Road, Harrow, Middlesex. Meets first Tuesday monthly, at St. Andrews Hall (side door), Ealing Road, Wembley (quite close to Wembley (L.M.S.) Station.

Sheffield

I am making a guess at this society's inter-club entry. It will be probably miniature, for Sheffield is particularly strong in that class. Indeed, if we leave out such workers as Draper and Hampshire (and neither will be competing so far as I know), I know of no club so strong in this class. Sheffield modellers not yet members should write:—A. MALTBY, 32, Abbeydale Park Crescent, Totley Rise, Sheffield. Meets first Thursday each month in The Howard Hotel, Howard Street, Sheffield, 1.

The Science Museum

I've been round once or twice lately in the Science Museum, and I must praise the fine layout of the ship models. There has been some loss of space, but the selection has been well done by Mr. White, who is in charge of this section. The buildings were very badly blitzed in the war and it will be some time before the repairs are done, hence the reason for much reduced exhibition space. Modellers should realise that there are many photographs available on all sorts of maritime subjects, many of which are not now on show. A letter to the Director may solve your problem.

Birmingham

Write to the secretary, R. E. WALKER, 72, Thetford Road, Great Barr, Birmingham, 22A, if you live in that locality. I understand there is a strong contingent coming to THE MODEL ENGINEER Exhibition, and it might be worth while contacting the secretary for particulars. Incidentally, I hear that this society is strong in timbering and planking work, probably due to the chairman's fine example.

H.M.S. "Implacable"

Those who served in the first commission in the Pacific may be interested to know that I may be able to arrange for the exhibition of the model which was made by the crew and presented to the Committee of Lloyds. I said "made by the crew." There were something like a dozen members who actually played a major part in this famous model, but most of the crew quite

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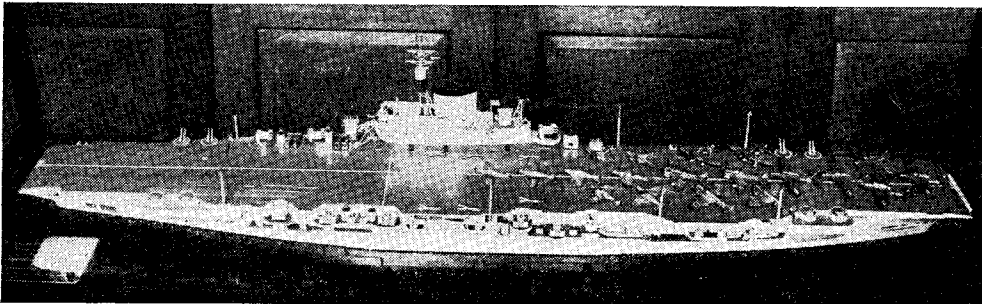
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proudly claim to have had a hand in it, even if only wiping off some dust or manhandling the case. The model is to the scale of $\frac{1}{4}$ in. to the foot, and I'll give you more information in a later issue. For the time being here is one

Stewards at the Exhibition

A rota of stewards is being prepared. The duty times are mornings and afternoons because there are always plenty of helpers available for evenings and Saturdays. If you would care to



A model of H.M.S. "Implacable" made by a dozen members of the crew. Needless to say the model is "correct"

picture to go on with. I am indebted in the first place to Mr. Skett, of Birmingham, for drawing my attention to it. He was one of the principal makers.

South West London

This busy society meets twice monthly, first and third Wednesdays in the month. The first Wednesday is quite informal and usually takes place in a member's home. The third Wednesday is the formal meeting at the Balham Labour Club, Balham Park Road (by Balham Station). Write Secretary: A. TUCKER, 23, Farnley Road, South Norwood.

Ilford and Romford

If you live in this district write to R. A. CHAPMAN, 218, Old Ford Road, London, E.C., for particulars of meetings, etc.

Do You Like Ships?

You don't have to be a modeller to join a society. If you like ships, if you are an artist, if you have travelled—why that's enough. Any society would welcome you. Just now there are several trips being organised, so get in touch with your nearest secretary.

offer your help write in the first place to the Wembley Secretary: MR. ROGER FINCH, 32, Bedford Road, Harrow, Middlesex. He may be glad of your services.

The Model Yachting Association are sharing the duties of running the stand and members of the various model yacht clubs should apply to their secretaries regarding offers of stewarding duties. The secretary of the Model Yachting Association is MR. I. V. DE YORKE, Dingles Den, Weston Green, Thames Ditton, Surrey. Don't forget to visit the stand to see one of the finest international A class yachts in the world. She is fresh off the stocks, but I think her owner, Walter F. Godfrey-Stone, is unduly modest about her.

Record Entries

I hear that there has been a record number of entries of ship models this year. Indeed, all previous records have been broken. I quite expected this and moreover, I expect a high standard this year. The more mass production there is, the better will be our individual craftsmanship.

For the Bookshelf

The Sheet-Metal Worker's Instructor. By R. H. Warn and J. G. Horner. (London: The Technical Press Ltd.) Price 7s. 6d., postage 3d.

The ancient art of sheet metal working, which seemed a few years ago to be liable to extinction, in the face of mass production of sheet metal ware by modern press tools, has now received an entirely new impetus through the introduction of all-metal or metal-clad aircraft, and other industries in which mass production is not generally practicable or economical. In the development of forms for production in sheet metal, the basis is geometry, both plane and solid, and mensuration, and the first part of the

book, therefore, is devoted to these subjects. Various practical problems in the projection of patterns for sheet metal objects are then presented, followed by two chapters on the properties and behaviour of various metals, under conditions of bending and stretching. Numerous forms of joints are described and illustrated, also the methods, tools and equipment used for sheet metal working.

While the book makes no attempt at covering all possible aspects of the subject of sheet metal working, it forms a useful and practical introduction, and will be found to simplify and elucidate many problems which seem difficult and obscure to the inexperienced worker.

A MODEL RAILWAY EXHIBIT

A brief description of the layout being built by the Ilford and West Essex Model Railway Club for the 1947 "Model Engineer" Exhibition

By "Finsbury"

THE Ilford and West Essex M.R. Club having been allocated a stand at the forthcoming MODEL ENGINEER Exhibition, will exhibit the Standard "OO" three-rail running layout which was on view during Easter week at the M.R.C.'s Exhibition, but in a modified shape and form, and with as many scenic additions as time will permit.

This layout, which is the result of combined operations by club members, was designed for flexibility of size and shape, with due regard to good running.

It consists of a double-track continuous run with one double junction leading to a main terminus, and another to a "hide-away" for storage of trains. Trackwork is of nickel-silver rail laid on $\frac{1}{8}$ -in. by $\frac{1}{16}$ -in. brass sleepers to a gauge of 16.5 mm. throughout, including curves. Ballasting, where completed, is with a mixture of granite and limestone chips, crushed in a home-made mill, built on the lines of the ordinary mortar-mixer. This will crush granite from $\frac{1}{4}$ -in. cubes or smaller, down to any pre-determined size (depending upon the adjustment of the footstep bearing), with the minimum of dust. Crushings are screened to give a residue of minus 16 and plus 40 mesh.

The main terminus has three platform roads; a goods arrival road and a run-round; a two-road running shed; coaling stage and a locomotive coaling road; and three goods sidings, a fourth having been extended to the adjacent section to give access to a recently-installed turntable. There are two locomotive spurs at the outer end of No. 1 platform road. Trackwork includes three double and two single slip points.

This station is wired for three controllers. The first for Departure trains and the inner track of the continuous run; the second for Arrival trains and the outer track; the third for the "Yard" controller for the station precincts. With two exceptions, all switching is done automatically by the movement of the points which are operated mechanically by wire pulls from the lever-frame. As an example, take the operation of a train into and out of No. 1 platform road; unless the road is correctly set an arriving train will stop outside the terminus section. When the necessary levers have been pulled over the train can be brought in on the "Arrive" controller and run up the platform on a push-button. The locomotive is uncoupled by means of the usual ramp, and run on clear of the train. Clearing the frame and pulling over the points for the locomotive spur(s) will allow a locomotive there to be brought out on to the train by the "Yard" controller, to take it out again when required. Setting the road to leave, having cleared the locomotive spur points, puts the road over on to the "Depart" controller; after the train has cleared the points, clearing the frame, pulling the locomotive spur point(s) will enable the trapped locomotive which

brought the train in to be run up into the spur by the "Yard" controller, without affecting the running of the main-line train.

This switching is applied to all the other roads. In fact, it is possible to run out a "light engine" straight from the shed to the main line on the "Depart" controller, or to bring one in on the "Arrive" controller right into the shed.

The "hide-away," where trains can be stored or "lost" until wanted, has four tracks each with its own locomotive spur. A turntable and locomotive storage tracks are provided, and this section has its own local "Yard" controller.

The two exceptions to the automatic switching noted above are: Firstly, at the main terminus a switch is fitted whereby all trackage (except a small portion of the "Arrive" road) is put over to the "Yard" controller at will, all existing interlocking due to point-setting being maintained. This allows a locomotive to be run from any road to the turntable or half-way out along the adjacent section of baseboard, on the "Yard" controller. Secondly, a similar system is used at the "hide-away" to allow the local operator to run in and "park" an accepted train on his own local "Yard" controller, thus sharing the work with the operator at the main terminus. These two switching arrangements have been incorporated in the light of the experience gained at the M.R.C.'s Show, and it is hoped they will make for smoother working.

The two terminal sections, and the turntable section for the main terminus, are ply-faced on wooden frames of 2 in. by 1 in. on edge. Unfortunately, it has not been possible to acquire sufficient plywood to cover all the sections, so $\frac{3}{8}$ -in. matched-boards have been used. Sections are located in correct register by detachable brass dowel pins, $\frac{1}{4}$ in. diameter, in brass sockets fixed flush in the end member of the frames. Two of these dowels, at least, are used at each joint. The holes for the brass sockets are jig-drilled through a $\frac{1}{4}$ -in. thick steel plate, carrying at its top two locators for positioning the tracks. The sections are pulled up together with 2-B.A. bolts and nuts, bearing on brass rubbing-plates screwed to the inside of the end member of the frame. This makes for a reasonably good joint for the tracks when using seasoned wood. When assembled, in almost any order, only minor adjustments are needed.

Power supply, 12-0-12 volts d.c., is from transformer-rectifier units using STC selenium rectifiers. There are four of these at present available amongst club members, three of them having additional supplies for point-motor operation, low-voltage for lighting, and a supply for solenoid-operated signals.

Any further information required by interested readers will willingly be given on application to the Club Secretary, or to any Club Steward on the stand at the Show.

"L.B.S.C."

"JULIET'S" BOILER FITTINGS

WHEN describing how to make the footplate fittings for "Hielan' Lassie," I warned all "Juliet" builders to take particular note of same, as the fittings for "Juliet's" boiler would be similar, and a lot of needless repetition would be saved. If they didn't "heed the gipsy's warning" in a manner of speaking, well, it's just too bad; because in dealing with "Juliet's" adornments I only propose to note where they differ in actual construction, from those on the "Lassie." Delinquents will have to rake out their back number for April 17th last, and put in a spot of overtime!

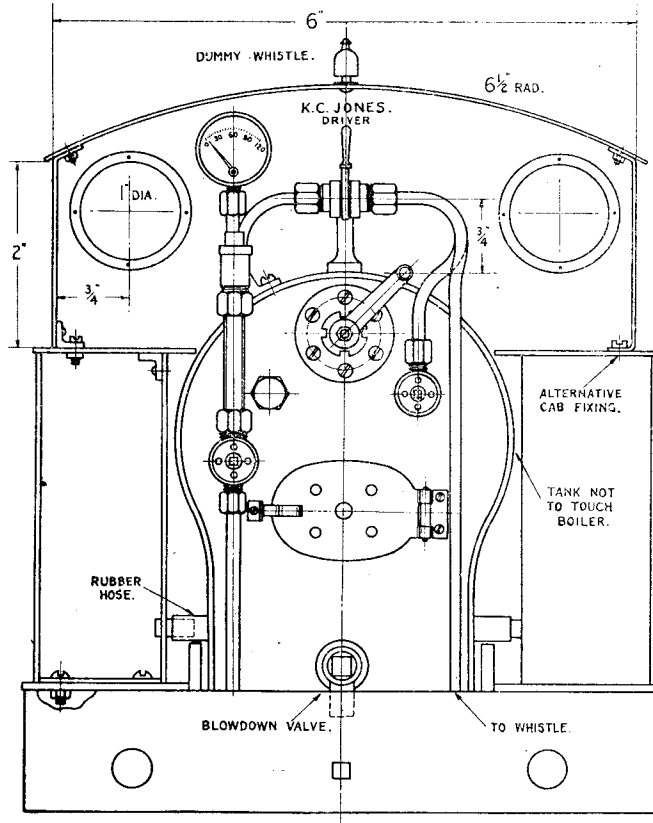
Starting from the top of the backhead, as per usual, the working parts of the combined turret and whistle valve are made in exactly the same way, and are the same size, as those on the "Lassie's" gadget, the difference in personal appearance being what is sometimes called "of a threefold nature." First, the stem which screws into the top of the wrapper is a little more giraffe-necked, to enable the centre-line of the valve to stand $\frac{1}{4}$ in. above the top of the wrapper. Secondly, the union screw for the pipe leading to the whistle, is on the opposite side of the turret (right-hand side, from footplate view) as the pipe goes down on the opposite side to the gauge-glass blowdown pipe. Thirdly, the handle, instead of being horizontal, points to the stars. Any beginner can make those small alterations without having to be told how to do the whole lot over again; he wouldn't follow these notes otherwise!

There are two slight differences in the water

gauge. The union screw for the blowdown pipe, instead of being on the skew-whiff to miss the firehole door, is diametrically opposite to the bottom gland, so that the pipe connected to it drops straight down through the footplate. The upper fitting, instead of screwing direct into the backhead, fits into a socket which is attached

to the edge of the firebox wrapper. This is shown separately in the little detail sketch, and may either be a casting, or sawn and filed down from a bit of $\frac{3}{4}$ -in. by $\frac{3}{4}$ -in. brass bar, to the dimensions given. The bottom should be radiused to fit snugly on the wrapper. Drill the $\frac{7}{32}$ in. hole in the upper part, either on a drilling machine, or in the lathe, with the drill in the three-jaw and the socket held against a drilling pad on the tail-stock barrel, so as to be quite certain the top gauge fitting lines up with the bottom one. A $\frac{5}{32}$ -in. hole is drilled up the centre, as shown by dotted lines, and a No. 40. hole in each projecting lug.

Next, at 1 in. from the centre-line of the top of the boiler, and $\frac{3}{16}$ in. from the edge, drill another $\frac{5}{32}$ -in. hole, and put the fitting directly over it, securing it by two $\frac{3}{32}$ in. or 7 B.A. brass screws, roundhead for preference. When fitting, screw a short bit of $\frac{1}{4}$ -in. rod in the hole, and mount the socket so that this stands at right-angles to backhead, and parallel to the centre-line of the boiler. When set O.K., tighten the screws, and solder all around it; if you hold a hot soldering bit against it, with a small blob of solder and a brushful of liquid flux, and then play a small blowlamp or blowpipe flame on the

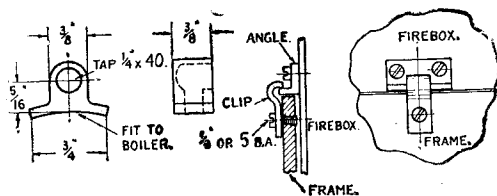


"Juliet's cab and fittings"

joint at the same time, the solder will flash clean through, leaving a neat and sound joint. Be sure to wash off any flux. The water gauge is then erected, and the glass put in, just as I detailed for the "Lassie."

The regulator and blower valve you already know about. The latter is connected to the right-hand union on the turret, by a piece of $\frac{1}{8}$ -in. copper tube with a union nut and cone on each end, as shown. Don't fit the whistle pipe until the noise-producer is ready for erection; you can make it when you like, same as described for "Lassie" last week, and fit it later, when side tanks are on, the clips being attached by the same nuts holding down the tanks. A $\frac{1}{2}$ in. steam gauge reading to 120 or 150 lb. is the next requirement, and is the only component I ever advise anybody to buy ready-made. Although I have given full instructions for making steam gauges, it is a very fiddling job at the best of times and apart from the delicate work involved, you have to get a big gauge in order to calibrate the small one, so might as well save time and trouble by buying a small gauge right away, and have done with it. It is attached to the left-hand union on the turret, by an inverted swan neck of $\frac{1}{8}$ -in. tube, with appropriate union nuts and cones. The big engines' gauges are usually attached to the cab front by screws through the flanges; but apart from the fact that small gauges are usually flangeless, it would be out of sight to a driver on a flat car behind the engine, so set it far enough back, to be easily seen.

The blowdown valve is the same as "Lassie's" and is situated in the centre of the backhead, just above the foundation ring. If the boiler is blown down now and then, with about 20 lb. pressure on the gauge—make sure the fire is



Socket for top of water gauge

Boiler clip

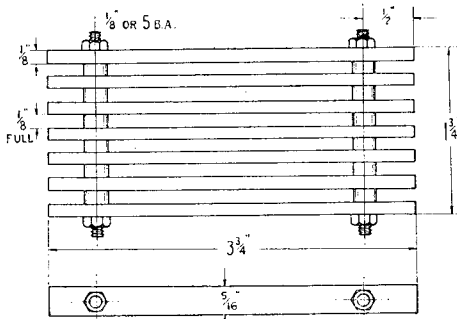
out!—is should need very little washing out; but if a lot of "fur" accumulates, as it may do in districts where the water is chalky, the boiler can be cleaned by taking the blowdown valve right out, and removing the dome. A small bent nozzle down the dome hole, coupled to the domestic water tap by a suitable bit of rubber hose, will soon shift all the dirt and scale.

On a simple job like "Juliet" there is no need to bother about riveting separate hinges on to the firehole door. If a casting isn't available (it *should* be) cut out the door from 18-gauge sheet steel, and leave two $\frac{1}{8}$ -in. tags on one end, and one ditto on the other. Bend the former into loops for the hinge pin, and the latter into a handle. The door is kept closed when needed, by a spring catch same as "Lassie," but you'll probably have to open it a bit when running, to save a lot of blowing-off. My old "Ayesha," now

in her twenty-sixth year, is still a dabster at blowing-off; and the only time the firehole door is shut, is after firing up, and the injector is working. Well, that settles the fittings; now all we need before erecting the boiler, will be the grate and ashpan.

Grate

Up to time of writing, the cast grates haven't materialised; advertisers tell me that it is the very dickens of a job even to get foundries to cast small wheels, let alone grates. *Cela ne faire rien—*



Details of grate

we'll have to make one. Seven pieces of black strip steel, each $3\frac{1}{2}$ -in. long, $\frac{1}{16}$ -in. wide, and $\frac{1}{8}$ -in. thick, will be needed. Drill a No. 30 hole $\frac{1}{8}$ in. from each end of one, and use as a jig to drill the rest. A dozen spacers are made by chucking a piece of $\frac{1}{2}$ -in. round steel, centring, drilling No. 30 for about an inch depth at a time, and parting off slices to a thickness of $\frac{1}{8}$ in. full. The bearers are two $2\frac{1}{2}$ in. lengths of $\frac{1}{2}$ -in. rustless steel; the rough-drawn stuff will do fine. If not available, use mild steel; but the rustless is best, as there is always condensation in the firebox when the engine is cold, same as in full size, and the moisture gets down to the bearers and rusts them away. I have had one or two grates collapse, owing to this, so now use rustless steel for all engines, and have had no further trouble. Put a few threads on each end of each bearer, either $\frac{1}{8}$ in. or 5 B.A.; assemble as shown, using ordinary commercial steel nuts, and have the same amount of bearer projecting beyond the nuts at each side of the grate. The projections locate the grate in the firebox, fitting into niches filed in the lower edges of the firebox side sheets. Don't forget that the spacers must be a weeny shade over $\frac{1}{8}$ in. wide, so that the grate measures $1\frac{1}{2}$ in. over the outside firebricks, when the nuts are tightened up.

Ashpan

The ashpan certainly is about "the simplest ever." It is made from a piece of 18- or 20-gauge sheet steel, 4 in. by $4\frac{1}{2}$ in., marked out and cut to the shape shown in the illustrations, and bent on the dotted lines. Tip to beginners: when bending up a job to conform to a fixed overall dimension, don't forget to allow for the thickness of the metal, when setting the job in the bench vice ready for bending. In the present instance, catch the piece of sheet metal in the vice with the

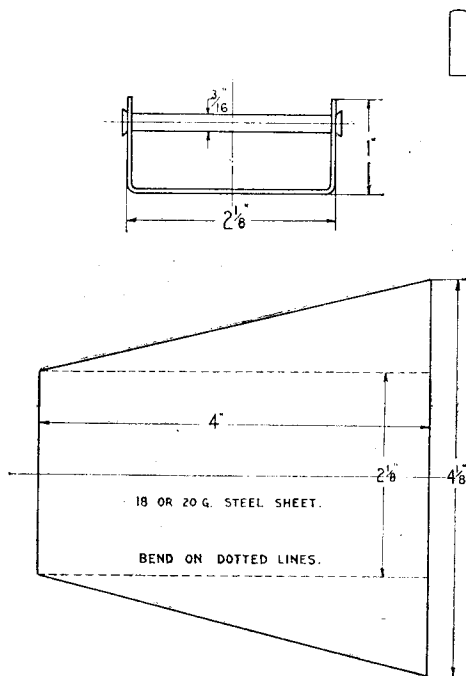
triangular part upwards; but the dotted line must not be exactly level with the top of the vice jaws. Set it *above* the vice jaw, a distance equal to the thickness of the metal; then hammer it over. Reverse the metal and repeat process; if a piece of iron bar 1-in. wide, or a little over, is placed in the bend already made, there will be no trouble in holding the work for the second bend. I keep a box handy to the bench vice, with a number of pieces of steel bar of different sections, to "pack out" on bending operations, and find them jolly useful time-savers. The tube for the retaining pin cannot be put in until the boiler is erected on frames, so this will be the next job.

How to Erect Boiler

If you haven't already done so, connect up the wet header of the superheater to the steampipe flange, and put the smokebox on the end of the

when erected, will look as though it had had "one over the eight," not to mention the party who did the job!

Set the smokebox and boiler on the frames, the bottom of the smokebox (or saddle, if you have used the separate saddle) going down between the frames above the cylinders, for about $\frac{1}{4}$ in. The longitudinal position of boiler will be settled by the holes for the blastpipe and steam pipes in the bottom of the smokebox. The bottom of the boiler should be approximately $\frac{3}{8}$ in. above the frames; so if you lay a couple of bits of $\frac{3}{8}$ in. rod or bar across the frames at each end of the barrel, and push down the boiler to rest on them, you won't be far out. Drill three No. 44 holes through frame and bottom of smokebox or saddle at each side; then lift the boiler off, open out the holes in frame with No. 34 drill, tap those in the smokebox bottom or saddle 6 B.A., replace boiler, and secure



Details of ashpan and how to erect it

boiler barrel, with a smear of plumbers' jointing to ensure it being airtight. If any air leaks into the smokebox, the partial vacuum induced by blast or blower is destroyed, and the boiler won't steam, the fire either burning very dull or going out altogether, for lack of oxygen being drawn through it. The boiler should enter the smokebox about $\frac{3}{8}$ in., and if a good fit, won't need any further fixing; but if at all doubtful, drill three or four No. 48 holes, clean through smokebox and end of barrel at the overlap, countersink them, tap $\frac{3}{32}$ in. or 7 B.A., and put in brass countersunk-head screws. Warning to beginners: see that the chimney is up straight and lining up with dome and safety valve; otherwise the boiler

with hexagon-head screws. I specify this size because the heads are fairly small and look neat, also there seems to be plenty about, as they were much used during the war; but you can use 5 B.A. or any other size that might be handy, if 6 B.A. are not available.

The firebox end is carried by two expansion brackets. These are $\frac{3}{8}$ in. lengths of $\frac{1}{16}$ in. by $\frac{3}{8}$ in. brass angle with one side filed away to a full $\frac{1}{16}$ in.; but you can bend up a bit of 16-gauge sheet copper or brass, to form the requisite angle if desired. Drill two No. 34 holes in the wider side, place at side of firebox with narrower side resting on frame—exact position immaterial—and run the 34 drill through the holes, making countersinks on wrapper sheet. Follow with No. 44, tap 6-B.A. and secure with brass screws. Finally sweat over the complete bracket and screwheads, as described for the water gauge socket. The clips to prevent the boiler lifting, are shown in the detail sketch which is self-explanatory; they are made from scraps of 16-gauge sheet brass, copper, or steel, and attached to the frames by means of a solitary $\frac{1}{8}$ in. or 5-B.A. screw, running through a No. 30 hole in bracket, into a tapped hole in frame.

Now connect up in smokebox, putting the nozzle on the blastpipe, and screwing the superheater union to the steampipe. The blast nozzle can be lined up with the chimney by poking a length of silver-steel down it ($\frac{5}{32}$ in. should fit exactly) and bending the blastpipe, if necessary, until the rod stands straight up in the middle of the chimney. The blower pipe you already know about, as it was described in the previous "Juliet" instalment; but if anybody would care to make an extra posh job of the blower, they can fit a ring instead of a single jet, by following the in-

structions given for "Lassie's" blower, but using one ring only instead of the twin arrangement. Make sure the jets of steam blow towards the centre of the liner, and not outwards. All interstices where the pipes pass through the bottom of the smokebox should be sealed, either with asbestos "putty" made by wetting a few scraps of asbestos millboard and kneading them up to the consistency of putty, or else smearing some

tube. It holds up the ashpan to the firebox, and the ashpan in turn keeps the grate in position. If the pin is pulled out at the end of the run, the whole issue falls clear of the engine; but mind that you clean the eccentric straps afterwards, so that no grit gets in and grinds them away. Apart from arranging the ashpan on the slant, to clear the straps, the sloping bottom allows anything falling through the bars, to roll down on to

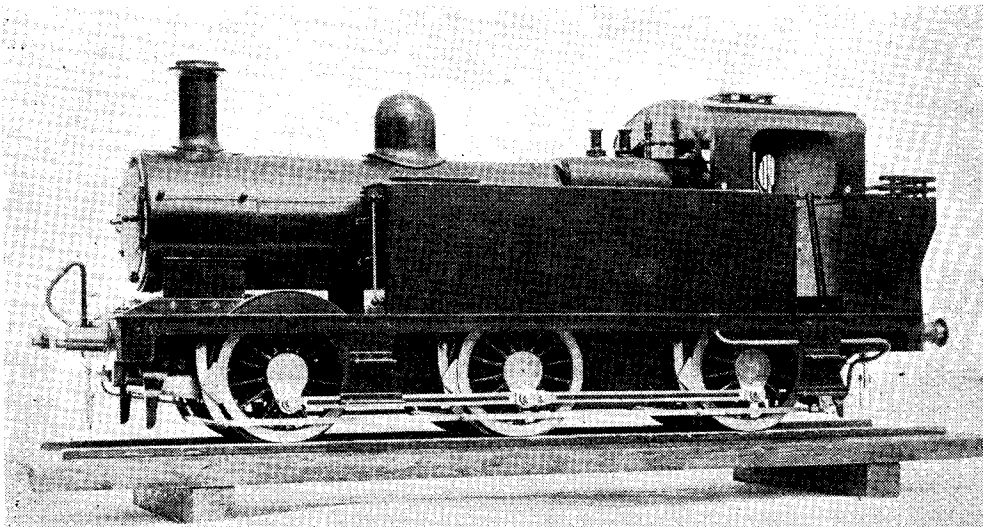


Photo by]

A fine "Molly" built by Mr. Evans of the Sutton M.E.C.

[C. J. Grose

plumbers' jointing on a few strands of asbestos string and winding them around the pipes close to the bottom of the smokebox, finally pressing down to form a grummet. See that the smokebox door closes airtight, and that's that!

Now turn the engine upside down on the bench; I use a couple of felt-lined wooden chocks to support the barrel, without damage to the mountings. At $4\frac{1}{2}$ in. from back of frame (measure from inside of buffer beam) and $1\frac{1}{2}$ in. from bottom, drill a No. 30 hole through both sides of frame. Drop the grate into the nicks at bottom of firebox; incidentally the easiest way of forming the nicks, is to drill a $9/64$ -in. hole at $5/32$ in. above bottom of firebox, and $23/32$ in. from each end, then file down to them with a thin flat file, to shape shown in illustration. This is, of course, done before erecting boiler. Put the ashpan in place, so that it rests on the bottom edges of the firebox. Run the 30 drill through holes in frame, and make countersink on the sides of ashpan. Remove same, drill out the countersinks with $\frac{3}{16}$ -in. drill, then put a piece of $\frac{3}{16}$ -in. copper tube $2\frac{1}{2}$ -in. long, through both sides of the ashpan, slightly belling the ends with a centre punch to prevent the tube falling out. The hole through the tube must be large enough to take a $\frac{1}{8}$ -in. pin, which is made from a piece of $\frac{1}{8}$ -in. silver or mild steel, about $3\frac{1}{2}$ -in. long. File one end to a rounded point, make a knob from brass or steel rod, and screw it on to the other end, and poke it clean through the frames and ashpan

the permanent way; and the ashpan, though necessarily shallow because of the "works" underneath, can never become choked up, and put the fire out.

Make up two clack boxes, as described for the "Lassie," in the issue previously mentioned. Drill two $\frac{1}{8}$ -in. holes on the centre line of "Juliet's" boiler, $1\frac{1}{2}$ in. from the smokebox; check the exact height each side with your scribing block, or if you haven't one, use a rule, with one end resting on the bench. Open the holes to $7/32$ in. tap $\frac{1}{4}$ -in. by 40, and screw in the clack box stems, so that the bodies stand vertical; then sweat them in, as described for the water gauge socket. Remove the balls whilst doing this, because some kinds of rustless balls aren't rustless any more if they are heated above a certain temperature. If you like, $\frac{1}{4}$ -in. by 40 bushes could be silversoldered into the boiler, when doing the dome and safety-valve bushes, and the clacks screwed into the bushes, instead of being screwed direct into the boiler shell and sweated over. The only thing is, if you adopt that method, don't make big unsightly bushes, so that the clacks stick out like a goblin's ears; on a big engine, they are fitted close to the boiler, and usually are small and neat. Well, all we need now to complete, are the side tanks, cab, a few bits of pipe, and trimmings, which I will deal with, all being well, in the next "Juliet" instalment. Water-tube boiler devotees please note,

(Continued on page 163)

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July 2

*Railway Interlocking Frames

by O. S. Nock, B.Sc., M.I.Mech.E., M.I.R.S.E.

No. 13—The Sykes Electro-Mechanical Frame—II

WE now come to the miniature part of the apparatus, containing the slides for the electric operation of the signals.

The general arrangement of the slide frame is shown in Fig. 1, and the actual electrical controls are extremely simple. Over the slides working certain of the signals there is a solenoid, the plunger of which is connected to a lock on the signal slide. The solenoid is used, in certain cases, to prevent a signal being pulled off if a train is standing on an electric fouling-bar; in other cases, it is used for inter-cabin slotting, or in conjunction with the lock-and-block apparatus.

In any event, it provides an electric lock on the slide. To avoid having the solenoid energised at all times when the particular slide is free to be moved a push contact is included, so that the circuit is only completed when the signal-man goes to operate the slide. Thus a considerable amount of current is saved. The actual operating contact for the signals consists of a pair of fingers, which, when the slide is pulled out, are bridged so as to complete the circuit.

Fig. 1 shows the disposition of the various units. The push contact for energisation of the electric lock is actuated by a spring plunger in the slide handle, shown in greater detail in Fig. 3. This plunger also acts as a mechanical latch, to prevent the inadvertent moving of the slide. The knob,

which forms the striker for depressing the contact finger, is $\frac{1}{8}$ -in. diameter, and this normally rests in a hole $\frac{9}{16}$ -in. diameter in the top plate, *A*. The plunger is depressed $\frac{1}{4}$ -in., and this moves the knob clear of the top plate; the shank of the plunger, which is only $\frac{1}{4}$ -in. diameter, can pass along the slot *B* in the top plate, and on completion of the stroke the plunger is released and the knob registers in the recess *C*. The contact finger is a piece of phosphor bronze strip $\frac{1}{8}$ -in. wide, with a pad of ebonite fixed on the top, so as to provide insulation from the plunger. The photograph shows a portion of one

of these slide frames under construction, and also shows the brass slide number plates fixed on the front face of the assembly.

In the particular frame illustrated in Fig. 1 the interlocking between the signal slides is accomplished in three locking trays, each 3-in. wide and each having five channels. At the left-hand end of the slide will be seen the mechanism for interlocking between signal slides and the full-sized point levers. The slide carries a jaw-piece which engages with a stud $\frac{1}{8}$ -in. diameter, located at a radius of $1\frac{1}{8}$ in. from the pivot of a half-crank. The full stroke of 2-in. on the slide causes the vertical shaft to rotate through 90 deg., and a similar crank arrangement at the foot of the shaft imparts a stroke of 2 in. to the tappet working in the point lever locking trough. These tappets actuated by the signal slides are located

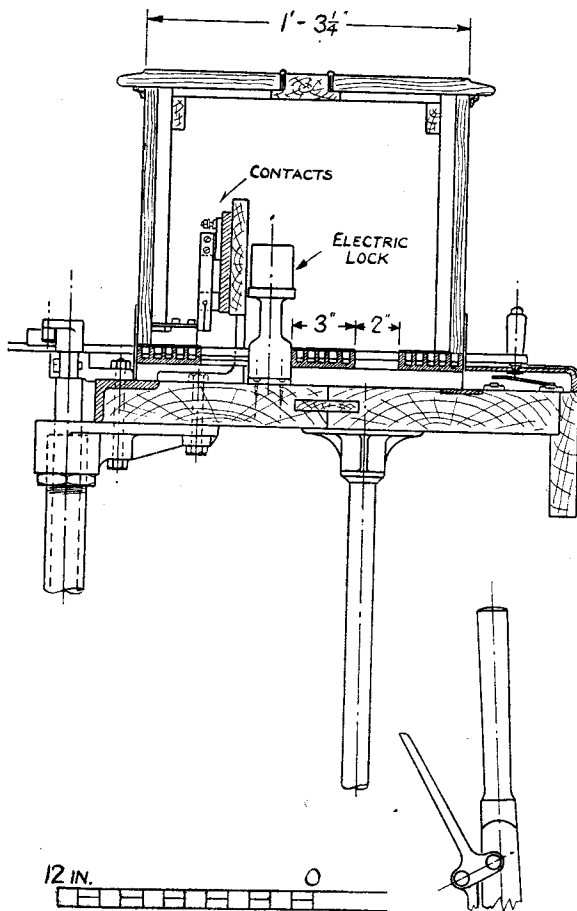


Fig. 1. General arrangement of slide frame

*Continued from
page 105, "M.E.,"
July 24, 1947.

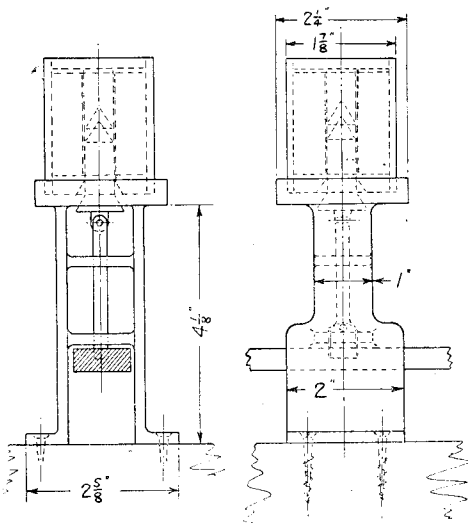


Fig. 2. Detail of solenoid

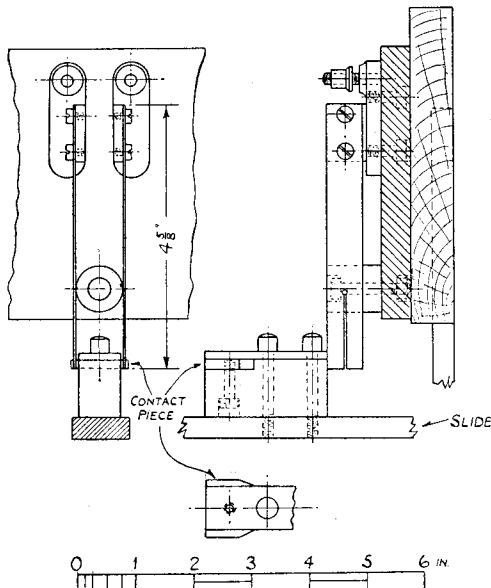


Fig. 4. Detail of operating contacts

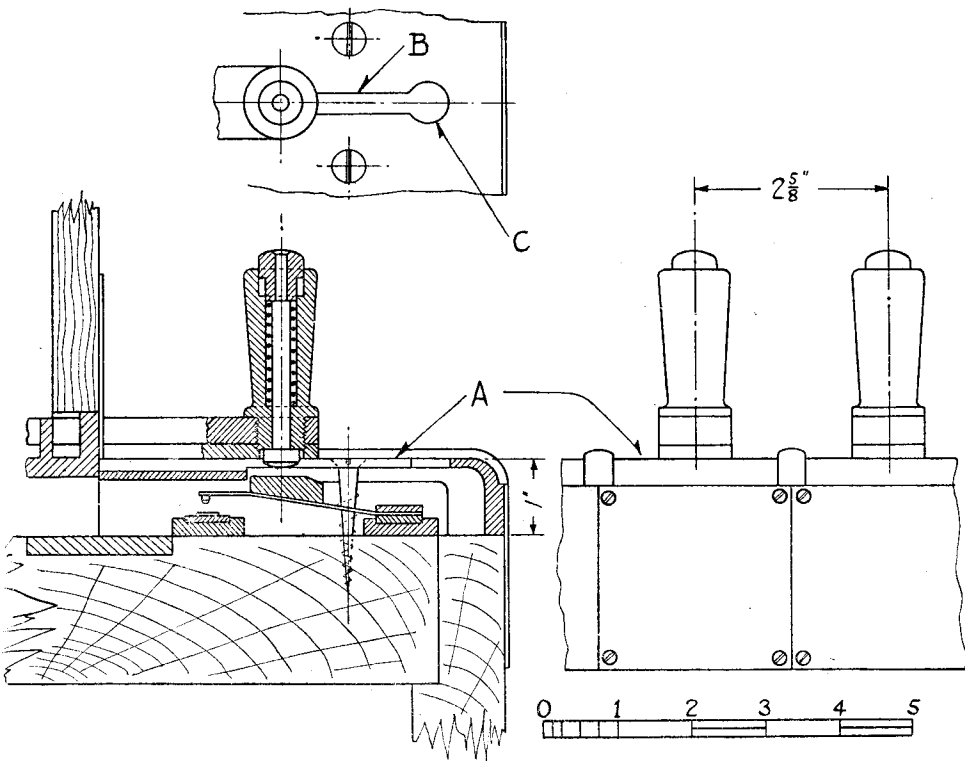


Fig. 3. View of slide handle and plunger contact

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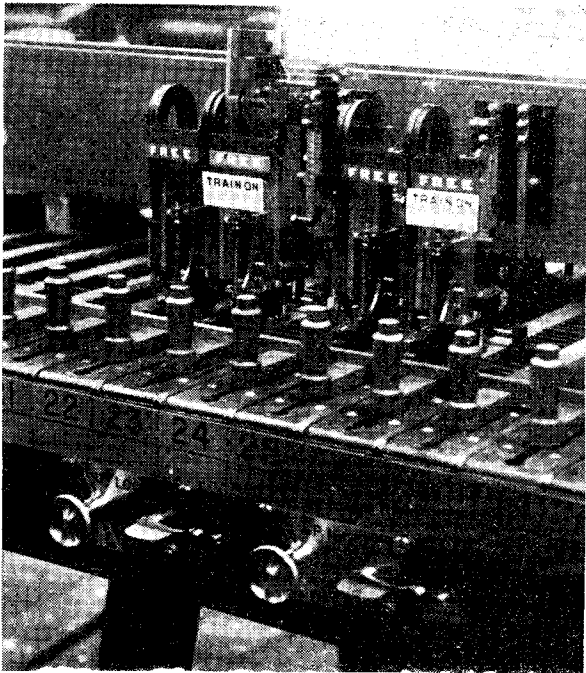
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between those connected to the point levers, so that, whereas the point levers are pitched $5\frac{1}{2}$ in. apart, the tappets in the locking troughs are $2\frac{3}{8}$ in. apart.

The solenoid for the electric locking, as illustrated in Fig. 2 is of conventional design. A brass pedestal casting spans the slide itself, and the cross ribs of this casting also provide guides for the plunger and the lock. The iron shell has an outside diameter of $1\frac{1}{8}$ in. and is $\frac{1}{8}$ in. thick; into this the iron bottom plate $\frac{5}{16}$ -in. thick is screwed, and the shell itself is screwed into the pedestal casting. The stroke of the plunger is $\frac{1}{2}$ in.

The operating contacts are illustrated in Fig. 4. They are carried on a wooden board, $6\frac{1}{2}$ -in. high by $\frac{3}{4}$ -in. thick which extends the full length of the frame. On this board is mounted a piece of



Miniature slides on Sykes electro-mechanical frames

ebonite, or other suitable insulating material, and to this the cast brass pedestals carry the contact fingers are screwed. These pedestals, it will be noted are in pairs, one left-hand and one right-hand. The contact fingers are set with a bias towards one another at their outer ends, and are spaced apart by the ebonite roller $\frac{1}{4}$ -in. diameter. The bridging-piece is mounted upon an insulating block carried on the slide, and it will be seen that the end first engaging with the fingers is flared to give a smooth entry.

In concluding these notes on the Sykes electro-mechanical frame I would once again express my gratitude to Mr. T. S. Lascelles, Managing Director of the W. R. Sykes Interlocking Signal Co., for his very kind assistance.

(To be continued)

"L.B.S.C."

(Continued from page 160)

fit your clacks on the backhead; either at the sides, on the centre line, or if you like, in place of the two outer water-tube cleaning plugs. In the latter case, the incoming water will shoot straight up the tubes and help to keep them clean.

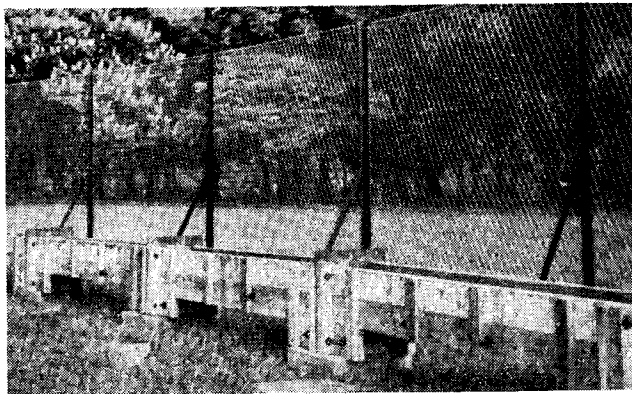
A Sad Catastrophe!

The other week a correspondent facetiously asked why it was that, as the Polar Route tried to follow big practice in every way, we didn't manage to have a bit of a wreck, or even a derailment, seeing that the big railways had been busy of late in that respect. Well, he just spoke out of his turn! On the evening of June 26th last, as the 9.5 p.m. down passenger train, engine 6003 G.W.R. four-cylinder 4-6-0 "King George IV," driver T. H. Glazebrook of Thornton Heath shed, was entering Purley Oaks south curve, the last coach jumped the road, tore up several sleepers and a number of rail fastenings, tumbled off the trestle and decanted the passengers in the ditch. The driver was unaware of anything happening until an emergency brake application pulled him up dead. Fortunately the accident happened right opposite the permanent-way store; and in a few seconds the gang were on the

job with new sleepers and rail fastenings. There was no damage to rolling stock, nor injury to passengers; and in less than 15 minutes, normal service was resumed.

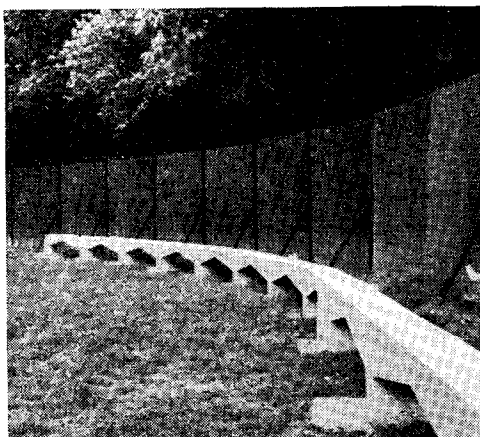
At the official inquiry into the cause of the accident, the permanent-way inspector said he had been over the line during the afternoon and found that it was all in order, the only defects being lack of replacements due to the usual shortage of materials and labour; but the alignment was quite suitable for normal traffic. Driver S. F. Sibley, also of Thornton Heath shed, corroborated this, and stated that his engine "Springfield Grange" had taken the curve well over the recognised speed limit, a little while previous to the accident, and there had been no sign of anything the matter with the road. Supt. Curly gave evidence that he had also been over the road with a heavy goods engine, which would have certainly given any warning if the road had been defective. The final verdict was, that the passengers must have been so interested in a passing Milly Amp, that the train arrived at the curve before they were aware of it, and the sudden swerve caught them off their guard and upset the whole box of tricks!

The Tees-side Miniature Railway



Details of the troughs

THE members of the Tees-side Model and Experimental Engineers are now very busy laying a multi-gauge passenger-carrying track in the Albert Park, Middlesbrough.



View showing part of the finished track foundation

This track is now well under way, as will be seen from the photographs. The main features are as follows: It is oval shape, and 660 ft. long with a minimum radius of 70 ft., and carries three gauges (2½ in., 3½ in., and 5 in.).

The track is laid on concrete arches, approximately 1 ft. 8 in. high, of which there are 112 in the full run. The rails are insulated from the concrete by a layer of felt and are of 1-in. × ½-in. section separated by ½-in. gas ferrules at intervals of 1 ft. 6 in.

At the entrance to the enclosure we are putting in a turntable and sidings to accommodate locomotives raising steam, the turntable is being constructed from steel angles, and supported on wheels running on a concrete foundation. We also hope to install a track circuit and colour signals for running at night.

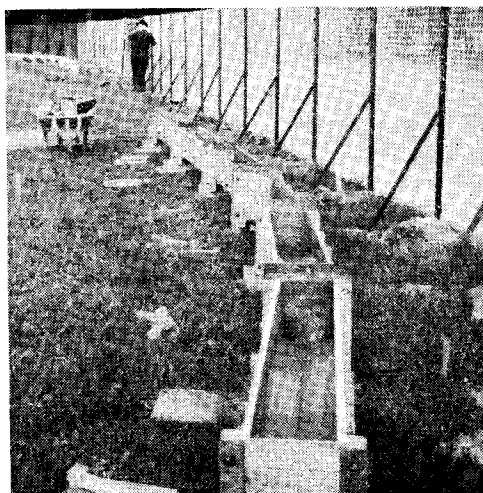
There are six passenger cars under construction; these are fitted with four-wheel bogies at each end and run on double-row self-aligning ball-races.

We are greatly indebted to the Middlesbrough Parks Committee, who have been of tremendous assistance to us, and are defraying all the costs of fencing, concrete and rails, and have shown much interest in this project.

We are also deeply grateful to the Sunderland and Malden Societies for their friendly advice.

We have been particularly fortunate in having a very keen member in Mr. Gordon Trevitt, who is in charge of the drafting out of the track and has made a fine job of it; also, the members who have assisted so wholeheartedly.

We hope to have the track complete by early September, but there is still a great deal of work to do, so we would be very pleased to receive any model engineers in this district who would care to assist. Also, anyone wishing to run his locomotive when the track is opened will be made very welcome, and should get into touch with me, V. Byrne, Sec. M.S.M.E., 2, Church Street, Middlesbrough, and I will inform them of the dates of opening and running.



View looking into the troughs for the concrete arches.

A TAILSTOCK DIE-HOLDER

by P.B.D.

ILLUSTRATED here is a die-holder for the lathe tailstock suitable for 1-in. and $\frac{1\frac{1}{8}}$ -in. diameter circular split dies. Its virtue lies in the absence of any elaborate details as found in the standard commercial product, resulting in an efficient tool which can be easily constructed by the model engineer. The design can be readily adapted to suit individual requirements necessitated by the various types of tailstocks.

This tool is unique in that it utilises the tailstock barrel as a guide for the die-holder, whereby we have eliminated the morse taper adaptor that is usually found on a tool of this type.

In Fig. 1 we see the tool in position on the tailstock in perspective form and dimensioned in Fig. 2.

Very little need be said as regards manufacture, since the design presents little difficulty. In suggesting my own method of tackling the job, I don't claim it to be the best and the one and only way, because very few minds think alike.

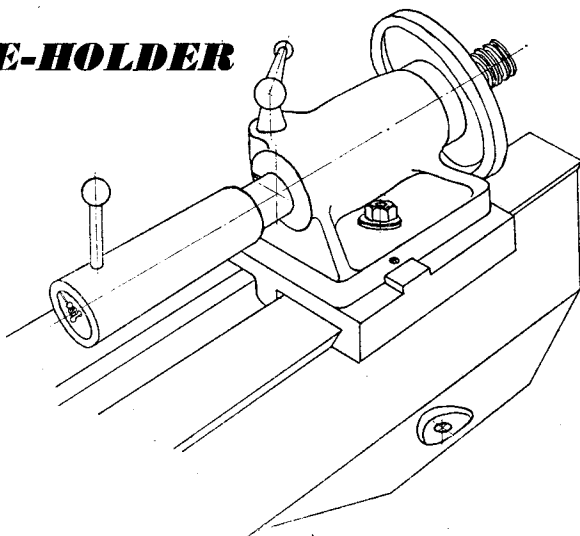


Fig. 1. Die-holder mounted on tailstock

to be pushed on a friction fit. The end of the die-holder can then be faced and tooled out to receive the dies, the internal diameters then being concentric. Four tapped holes for screws were put in to secure and adjust the split dies, the screws being $\frac{3}{16}$ -in. Whitworth socket head, or the Allens variety. The die-holder can be con-

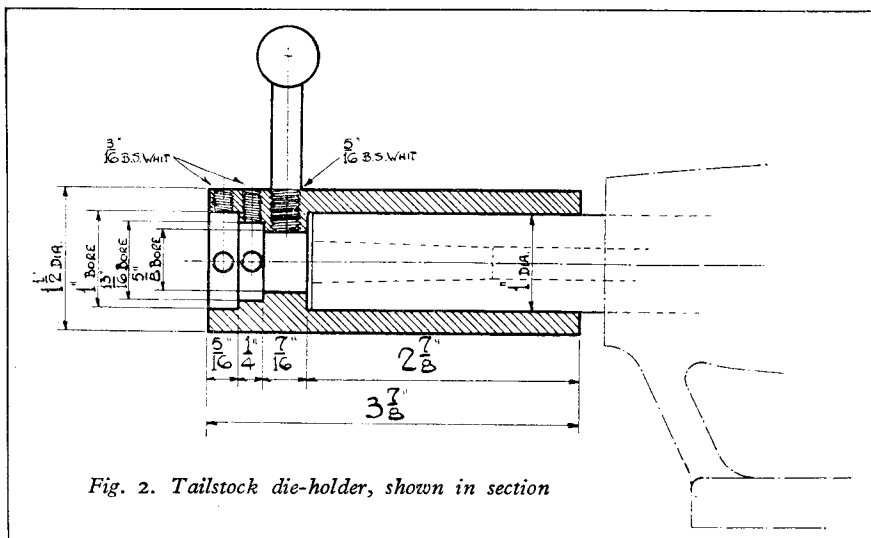


Fig. 2. Tailstock die-holder, shown in section

To make a start, I gripped a 4-in. length of $1\frac{1}{2}$ in. diameter bright mild steel in the three-jaw, faced the end and bored right through $\frac{1}{2}$ in. diameter; this was opened out to 1 in. diameter for a depth of $2\frac{7}{8}$ in. The finished bore should offer a sliding fit on the tailstock barrel free from shake. To bore the opposite end to take the dies, an adaptor was made by gripping a piece of mild steel, say, $1\frac{1}{2}$ in. diameter in the chuck and turning down to 1 in. diameter to allow the die-holder

trolled and prevented from rotating when screwing on the lathe by means of the ball lever, which in my case was turned from the solid and screwed $\frac{5}{16}$ -in. Whitworth.

The effective length of travel of the die-holder is 2 in., but this could be increased by the constructor, provided the tailstock barrel will project from tailstock a sufficient amount to support it. In my case 3 in. was the maximum projection but I am satisfied with a 2-in. travel.